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B.K. Shishkin, Editor

Umbelliflorae

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Volume XVI

Umbelliflorae

Chief Editor B.K. Shishkin
Volume Editor B.K. Shishkin

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SUBJECTS AND CONTRIBUTORS

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Addenda – Descriptiones plantarum novarum in
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PREFACE

Volume XVI comprises the Araliaceae and a large part of the Umbelliferae, the former described by A. I. Poyarkova, the latter by B. K. Shishkin, E. P. Korovin, I. A. Linchevskii, E. G. Bobrov, and B. A. Fedchenko. Most of the genera of Umbelliferae are treated by B. K. Shishkin. This volume includes a key to all the genera of Umbelliferae of the USSR, which takes into account the anatomical characters of their fruits.

The Umbelliferae were extremely difficult to describe as many species and especially those of Central Asia were described from incomplete material, often without the ripe fruits being available. The generic status of some plants could therefore not be established satisfactorily. In any case, as far as the Umbelliferae are concerned the flora of Central Asia has not yet been adequately studied.

The next volume (XVII) includes a key to the genera of Umbelliferae based on superficial characters, without reference to the anatomy of the fruits.

Editorial Board

1 Order 30. **Umbelliflorae** BARTL.

Flowers cyclical, with calyx and choripetalous corolla, calyx often abortive, with inferior ovary, 4-5-merous, usually bisexual; carpels 1-5 or many, each with 1 (rarely with 2) drooping inverted ovules, with 1 integument; seeds with copious endosperm; flowers usually in umbels, rarely inflorescence different. Herbs, rarely shrubs or trees.

Family CXVIII. **ARALIACEAE*** VENT.

Flowers regular, bisexual or polygamous, usually 5-merous, rarely 3 to multi-numerous; calyx with small teeth or inconspicuous fringe; leaves small, with valvate aestivation or overlapping at margins; stamens 5, rarely 2 to many, filaments filiform, anthers ovoid, opening by longitudinal slits; ovary usually inferior (rarely semiinferior or superior), 2-5(6)-locular (rarely multilocular), 1 ovule in each cell, drooping, inverted, recurved above, with ventral suture and 1 integument; styles 2-5(6), free or more or less adnate to tube; stylopodium conical or flat-pulvinate; fruit 1 to multi-merous, usually 2-5(6)-locular, berry-like or drupaceous, sometimes separating into individual cells; exocarp fleshy, rarely coriaceous, endocarp cartilaginous, coriaceous or sclerotic; seeds often flattened, with developed smooth or plicate endosperm usually with small apical embryo. Trees, shrubs, climbing lianas or perennial herbs, sometimes prickly; deciduous or perennial, with alternate or opposite simple, entire, lobed, also palmately or pinnately compound leaves; stipules adnate to petioles or absent. Flowers usually in umbels or heads, solitary or inflorescence compound.

2 There are about 60 genera and 450 species which are mainly tropical with emphasis on Indo-Malaya and tropical America. Some genera are indigenous to temperate East Asia and North America. *Hedera* alone grows in Europe.

Key to Genera

- 1. Leaves simple, entire or lobed 2.
- + Leaves palmately or pinnately compound 5.
- 2. Leaves palmatilobate, with prickles along nerves; stem and branches densely covered with acicular prickles; umbels in oblong compound raceme 933. *Echinopanax* DCNE. et Planch.

* Treatment by A.I. Poyarkova.

- + Leaves not prickly, stems and branches without prickles or with large lamellate prickles at base 3.
- 3. Climbing liana, without prickles; leaves entire or 3-5-lobed, with entire margins 932. *Hedera* L.
- + Small trees; leaves 5-9(11) palmatilobate with dentate margin 4.
- 4. Leaves coriaceous, perennial; stems without prickles; umbels of flowers in oblong panicle * *Fatsia* Dcne. et Planch.
- + Leaves herbaceous, deciduous; stem and branches with large prickles; umbels in dense, nearly globular corymb. 936. *Kalopanax* Miq.
- 5. Leaves palmately compound 6.
- + Leaves imparipinnately compound; tall perennial herbs, trees or shrubs; umbels in panicle, rarely in raceme 937. *Aralia* L.
- 6. Low herbaceous plants, the simple stem terminated by one umbel; leaves in 1 whorl; fruit red 938. *Panax* L.
- + Shrubs, with black fruits 7.
- 7. Ovary 2-locular, styles 2; fruit with 2 stones; petioles glabrous or scarcely pubescent, articulate with rachis 934. *Acanthopanax* Seem.
- + Ovary 5-locular, styles 5; fruit with 5 stones; petiolules not articulate, densely pubescent 935. *Eleutherococcus* Maxim.

Genus **★FATSIA★** Dcne. et Planch.

Debe. et Planch. in Rev. hort. 4 sér. III (1854) 105

Flowers bisexual or polygamous, 5(6)-merous; calyx-teeth nearly 3 inconspicuous; in bud petals slightly overlapping; filaments filiform, and anthers ovoid, dorsifix; stylopodium thick, subglobular; styles 5, free from base, filiform, with small stigmas; ovary and fruit 5-locular, with fleshy exocarp and cartilaginous endocarp; seeds laterally compressed. Small trees, without prickles with large, evergreen, palmatilobate, exstipulate leaves. Umbels clustered in apical panicle.

One species, Japan.

★*F. japonica* (Thunb.) Dcne. et Planch. in Rev. hortic. s. 4. III (1854) 105.— *Aratia japonica* Thunb. Fl. jap. (1784) 128.— Ic.: In Gartenflora, XII, tab. 420; XXVI, tab. 216; Bot. Mag. tab. 8638.—

Shrub or 2-3 m high tree, usually with simple stem, with a rosette of large coriaceous, bright green, shining, glabrous leaves at apex of stem, the leaves 15-30 cm across rounded or rounded-ovate, (5)7-11-lobed, the ovate-lanceolate lobes tapering at base, acuminate above, acutely toothed along margin above base, petioles to 30 cm. Umbels globular, 2.5-3.5 cm across, long-stalked, gathered in large panicle; each flower with small bract at base; petals ovate, acute, recurved below; fruit globular. Fl. September-October, Fr. winter.

Widespread in greenhouses and as a house plant. Described from Japan. Gen. distr.: Japan. Type in Stockholm.

Economic importance. A fast growing ornamental suitable for cultivation in the Crimea and Caucasus. Judging by experience in Central

* Popular Japanese name for the plant.

Europe it will grow under cover in the southwestern regions of the European part of the Soviet Union. There are cultivated forms with variegated or white- and yellow-bordered leaves.

Genus 932. **HEDERA** * L.

L. Sp. pl. ed. 1 (1753) 202, p.p.

Flowers bisexual, 5-merous; calyx of 5 small denticles; petals oval-triangular, with 1 nerve, valvate in the bud; stamens 5, with ovoid anthers, stylopodium convex, ovary inferior or semiinferior, 5-locular, styles 5, adnate to tube; fruit berry-like with fleshy exocarp and coriaceous endocarp; seeds 5 or 2 to 4, with plicate endosperm and rather large embryo. Shrubs or climbers adhering to support with aerial root suckers, leaves evergreen, coriaceous, entire, 3-5 palmatilobate; stipules absent. Umbels solitary or in racemes; pedicels not jointed.

About fifteen species in the temperate mountain regions of southeastern Asia, the Mediterranean area, and Central Europe.

In the USSR *Hedera* is known from the Upper Cretaceous to Pliocene deposits (Akchagyl stage); the earliest finds are not always reliable: *H. auriculata* Heer, Upper Oligocene, Angara-Sayans (Ushakovka River near Baikal).— *H. colchica* v. *fossilis* Palib., Akchagyl deposits, Transcaucasia (Shvindgeli Range in S. Kakhetia); Chauda deposits, southwestern Guria.— *H. cf. cuneata*.— Heer, Tertiary Sakhalin (Kamennaya valley and others).— *H. eichwaldii* Palib., Paleogene, Volga-Don (Tim).— *H. macclurii* Heer, Cretaceous, Sakhalin (Jonquières Cape), Upper Cretaceous or Paleocene, western Kamchatka (Utkholok Cape, Kapan River, Kovacha River).— *H. macquarrii* Heer, Paleogene, Ussuri (Friz Strait).— *H. palaeocenica* Krassn.?, Paleocene, Lower Volga (Ushi).— *H. primordialis* Heer, Cretaceous, Sakhalin (Kengvarakry Cape).— *H. ochotica* Krysht., Upper Cretaceous, Lena-Kolyma (Silyan River).

- 1. Hairs yellow-brown, flat, squamiform, multicellular. 2.
- + Hairs grayish, stellate, 5-8-rayed 3.
- 2. Leaves on sterile shoots thick, coriaceous, wide, usually entire, rarely 3-lobed; calyx-teeth present; fruit large, to 10-13 mm across 1. *H. colchica* C. Koch.
- + Leaves thin, coriaceous, on sterile prostrate shoots usually ovate to lanceolate, lobed or angular, commonly together with entire leaves, on climbing shoots entire; calyx-teeth obsolete; fruit 6-10 mm across 2. *H. pastuchovii* G. Woron.
- 3. Fruit golden yellow, 10-12 mm across; leaves pale, usually yellow-green, with undulate margin; hairs usually 5-6-rayed 3. *H. chrysocarpa* Walsh.
- + Fruit black, smaller, to 10 mm across 4.
- 4. Petals 2-2.5 mm long, 1.5 mm wide; umbels on thin pedicels; not dense at anthesis, the terminal 20-27(32) mm, the lateral 15-25(27) mm across, leaves on sterile shoots mostly sagittate, usually 3-lobed, with attenuate median lobe; hairs usually 5-6-rayed 5. *H. caucasigena* Pojark.

* Latin name for ivy.

- + Petals larger, 3–4 mm long, 1.8–2.5 mm wide; umbels usually dense, larger, the terminal 23–35(47) mm across, the lateral 20–35 mm, with thicker pedicels; hairs predominantly 6–7 or 7–8-rayed 5.
- 5 5. Hairs usually 7–8-rayed, rays often adnate. On sterile shoots sagittate, usually 5-lobed leaves with attenuate median lobe predominate, or else such leaves are borne in large quantity 6. *H. taurica* Carr.
- + Hairs usually 6–7(5–8)-rayed, with rays adnate only at base; leaves of sterile shoots wide, rounded or ovate, entire or 3–5-lobed, sagittate leaves absent or few 4. *H. helix* L.

Series 1. *Robustae* Pojark. — Hairs squamiform, multiradiate, with rays only distally free; leaves thick, coarse-coriaceous, large, on fertile shoots to 20 cm long, on sterile usually entire, wide, cordate; fruit black, large, 10–13 cm across. Two species: *H. colchica* C. Koch of the Colchi flora and *H. robusta* Pojark, C. China (Szechwan province).

1. *H. colchica* C. Koch in Wochenschr. f. Gartn. u. Pflanzenk. II (1859) 74; Boiss. Fl. or. II (1872) 1090; C. K. Schn. Laubholz. II (1909) 422, p. p.; Tobler, Gatt. Hedera (1912) 52, p. p.; Medved., Der. i. kust. Kavk. (1919) 172; Grossg., Fl. Kavk. III, 108; Nekrasova in Sov-bot., No. 6 (1933) 88. — *H. helix* var. *colchica* C. Koch in Linnaea, XVI (1842) 365; Ldb. Fl. Ross. II, 1, 376. — *H. rhombifolia* Rupr. ex Regel in Gartenflora, IX (1860) 372. — *H. Roegneriana* hort. ex Boiss. Fl. or II (1872) 1901, nom. nud. — *H. macrophylla* hort. — *H. dentata* Rupr. ex Regel in Gartenflora (1884) 199, nom. nud. non C. Koch in Wochenschr. f. Gartn. XI (1868) 141. — *H. caucasica* hort. ex Lavallée, Arb. segreg. (1877) 126, nom. nud.; Carr. in Rev. hort. 62 (1890) 164, diagn. — Ic.: Regel in Gartenflora, XI (1862) tab. 360.

- Shrub; large-leaved liana, the thin sterile shoots climbing with short root-suckers on trees and rocks, fertile shoots thicker, to 1 cm across, juvenile shoots with yellow squamiform multiradiate hairs; leaves coarse, densely coriaceous, matte, dark green, glabrous above, with scattered squamiform hairs below; later sometimes deciduous, to 20 cm long, 17 cm wide; leaves on sterile shoots usually ovate or orbicular-ovate, rarely rhombic-ovate, with cuneate cordate or truncate base, commonly short-acuminate, often entire, rarely 3-lobed, sometimes 5-lobed; leaves on fertile shoots from ovate and rhombic-ovate to lanceolate and lanceolate-rhombic or narrowly rhombic (*f. rhombifolia* Boiss.), short- or long-
- 6 acuminate; petioles as long as blade or even slightly longer to short, barely $\frac{1}{3}$ the length of the limb. Umbels with 12–35 flowers, globular, solitary or 3–8 in raceme, pedicels 2–3 cm, with small scarios, triangular leaves at base; all parts of inflorescence, including ovary and outer side of petals, densely covered with yellow-brown squamiform multiradiate hairs; pedicels 4–7 mm, to 17 mm in fruit, with small squamiform, membranous, 1–2 mm long, deciduous bracts at base. Flowers usually bisexual, occasionally staminate, with abortive ovary; sepals 1–1.5 mm long, ovate-triangular, acute; petals greenish-yellow, 4–4.5 mm long, 2–2.5 mm wide, oblong-ovate, acuminate; stamens slightly shorter than petals, anthers ovoid, 1.75 mm long, 1 mm wide, stylopodium low-conical; styles 1.5 mm long; fruit black, 10–13 mm across, with 2–5 seeds. Fl. September–October, Fr. ripening in the spring and summer of the next year.

Shady forests, climbing rocks and trees, where the climbers produce dense growth; to 1,200m. — Caucasus: Cisc. (Laba River), W. Transc. from Tuapse to Batumi, in the east up to Surami Range. Gen. distr.: Bal.-As. Min. (Lazistan, Trebizond), Arm.-Kurd. (Artvin district). Described from Colchis. Type was in Berlin.

Economic importance. Sometimes cultivated in Crimean and Caucasian parks; but, judging by W. European experience, probably also adapted to more northern regions. One specimen grows in the University Botanical Gardens (Nekrasova) in Moscow. Should be tried as an ornamental liana on walls, windows, trees, cliffs, etc. *F. purpurea* Hibb., with reddish leaves, *f. arborescens* Koch., and *f. variegata* Koch., are but a few of the known cultivars.

Note. Tobler's record of *H. colchica* from Syria (cf. Nekrasova) presumably concerns cultivated specimens, as Tobler himself assumed with respect to his record for Cyprus.

Among the plants collected in C. China (Szechwan province) by the noted Russian traveler Potanin, there were found specimens of a new species — *H. robusta* Pojark. which closely resembles *H. colchica* in external habit but differs by the very short style and the absence of calyx-teeth, the calyx being just a barely discernible border. This find once again reflects the ancient link between the forest flora of Colchis and the flora of China, dating from the Tertiary.

Series 2. Pastuchovianae Pojark. — Hairs squamiform, the rays often free to middle; leaves thin-coriaceous, medium-sized, to 10(12) cm long, on sterile shoots of different shape: entire, angular, 3–5(7)-lobed, commonly mixed with sagittate leaves with attenuate median lobe; fruit black, 6–10 cm across. In addition to the Russian species, *H. tobleri* Nakai and *H. shensiensis* Pojark. from N. China, Japan and S. Korea, should also be included here.

2. *H. pastuchovii* G. Woron. in Grossg., Fl. Kavk. III (1932) 108; G. Woron. in Trud. Bot. inst. AN SSSR, ser. 1, I (1933) 217, lat. diagn.; Nekrasova in Sov. bot. No. 6 (1933) 88. — *H. helix* C.A. Mey Verz. Pfl. kauk.-kasp. (1831) 98 et auct. fl. cauc. p.p. non L. — *H. colchica* Tobler, Gatt. Hedera (1912) 52, p.p. non C. Koch. —

Tall climbing shrub with thin pale brown shoots bearing sparse flat stellate yellow scales; leaves thin-coriaceous, lighter than in *H. helix* and *H. colchica*, bright green above, pale beneath, glabrous on both sides or with sparse stellate scales beneath, to 10(12) cm long, 6(7) wide, without the characteristic odor of the leaves of *H. colchica*; leaves of spreading shoots usually rounded-cordate, entire or with slightly undulate-angular margins, on sterile climbing shoots leaves very variable, from broadly ovate to oblong-ovate and lanceolate, the base deeply cordate or slightly notched to truncate and cuneate, with large symmetrically paired or irregular (from 0 to 5) lobes at each side, margins usually angular, often entire; leaves on fertile shoots mostly rhombic or ovate-rhombic, tapering at both ends, sometimes long-acuminate, usually with obtuse tip, nearly always entire; petioles with sparse stellate scales of varying length. Umbels globular, with 5–20 flowers, not dense, on thin rather long pedicels (1.5)2–6 cm, solitary or raceme of 3–8 umbels; pedicels 6–12 mm; all parts of inflorescence, including ovary and outer

side of petals, densely covered with stellate yellow-brown scales; sepals inconspicuous; styles 1–1.5 mm long; fruit black, 6–10 mm across. Fl. August–October, Fr. ripening from December to summer of the following year. (Plate I, Figure 2.)

Lowland and mountain forests of the low and central mountain belts, usually along forest edges and in glades, where it climbs trees without spreading along rocks like other species of ivy. Rather rare.—Caucasus: E. Transc. (Tionetskii Range, Zakataly, Nukha, Kuba), Tal. (Lenkoran district). Gen. distr.: Iran (Astrabad and Mazandaran). Described from Kusary near Kuba, E. Transcaucasia. Type in Leningrad.

Economic importance. Unknown in cultivation but not less promising than other species of ivy.

- 8 Note. Yu. N. Voronov rightly considered this species to be much closer to the Himalayan *H. himalaica* Tobl. (which should be called *H. nepalensis* C. Koch) than to *H. colchica* C. Koch. Even so, *H. nepalensis* is not the closest relative of *H. pastuchovii*. With *H. sinensis* (Tobl.) Hand.-Mazz. (China), another species of SE Asia, it forms a natural phylogenetic series, distinguished by orange-yellow fruits. *H. pastuchovii* surely is much more closely related to black-fruited *H. tobleri* Nakai (Japan, S. Korea), from which it differs materially only by the smaller fruits and leaves. In both species the leaves of the sterile shoots are highly polymorphous, from entire to lobed; on fertile shoots they are usually narrower.

Series 3. *Chrysocarpae* Pojark.—Hairs stellate, 5–6(8)-rayed; fruit golden yellow, large, to 12 mm across; leaves of sterile shoots mostly entire, occasionally angular or faintly 3-lobed. One species in the E. Mediterranean area.

3. *H. chrysocarpa* Walsh in Trans. Hort. Soc. Lond. VI (1826) 42.—? *H. poetica* Salisb. Prodr. (1796) 143.—*H. poetarum* Bertol. Praelect. rei herb. (1827) 78; Tobler, Gatt. Hedera (1912) 36; Nekrasova in Sov. bot. No. 6 (1933) 88.—*H. helix* var. *chrysocarpa* Ten. in Caruel, Fl. Tosc. (1860) 300, non DC.; C. K. Schn. Laubholz. II (1909) 422.—Ic.: Tobler, l. c. f. 11–14.—Exs.: Fl. ital. exs. No. 1088.

- Tall shrub, climbing trees and rocks, its sturdy yellow shoots glabrous or with sparse stellate hairs; bark of older branches pale, grayish-yellow, rugose or finely cracked; leaves thick, coriaceous, pale, yellowish-green, shiny above, glabrous on both sides, juvenile leaves sometimes with sparse stellate hairs larger than in *H. helix*, to 11 cm long, 10 cm wide, commonly with undulant margins; leaves on sterile shoots usually broad, wider than long or rounded, rarely ovate, 3-lobed or angular with 3–5 lobes, partly entire; on fertile shoots usually broadly and suborbicular, ovate, acute or short-acuminate, the base truncate or cordate, rarely rhombic-ovate, long-acuminate with cuneate base; uppermost leaves sometimes lanceolate-rhombic. Inflorescence large, of (3) 5–15 umbels sessile on long, 3.5–5 cm pedicels; umbels globular, to 3 cm across, multiflorous; all parts of
9 inflorescence with dense yellowish usually 5–6-rayed stellate hairs, often some rays united for $\frac{1}{3}$ to $\frac{1}{4}$ of their length; pedicels 7–12 cm; sepals 0.5 mm long, usually oblong-triangular; petals 3.5–5 mm long, 2.25–2.5 mm wide; styles 1–1.25 mm long; fruit golden yellow, 8–12 mm across, 3–5-locular, mostly with only 2(3) developed seeds. Fl. August–September, Fr. from December to summer of the following year.

Forests of low mountain belt. — Caucasus: W. Transc. (Guria, Kvirily, possibly wild), E. Transc. (Tbilisi, Kirovabad, apparently escaped). Gen. distr.: Bal.-As. Min. (eastern part of Balkans, from Attica to Thrace and Macedonia), As. Min. In Italy, Spain, NW Africa and Egypt apparently escaped from cultivation. Described from near Constantinople. Type unknown.

Economic importance. Of the species of ivy, *H. chrysocarpa* is of special importance because of its pale green foliage and golden yellow fruits. According to Walsh, the fruit is used in Turkey as an emetic and laxative and is also prescribed by local doctors.

Note. In spite of its unique habit this species is usually regarded as a variety of *H. helix* L., from which it is distinguished by the larger — to twice as large — yellow fruits, the larger pale leaves of the fertile shoots, the more compound inflorescence — often with 12–15 umbels — and the larger (to 5 mm long) petals. Also the hairs of *H. chrysocarpa* rarely have more than 5–6 rays.

The distribution area of *H. chrysocarpa* extends from the eastern part of the Balkan Peninsula over Asia Minor up to the Caucasus, where its boundary is still obscure.

In his monograph of *Hedera*, Tobler replaced *H. chrysocarpa* Walsh by the newer *H. poetarum* Bertol., claiming the former name to be a *nomen nudum*. Recognizing *H. chrysocarpa*, the present author has demonstrated that it differs from *H. helix*. Reference to Tournefort's short diagnosis of this ivy supports the claim that *H. chrysocarpa* Walsh is a valid name.

H. poetica Salisb. (Prodr. (1796) 143), also quoted in the Index Kewensis, possibly refers to *H. chrysocarpa*. We did not have access to the source of this reference but if *H. poetica* Salisb. was published 10 according to the international rules of nomenclature and does indeed refer to *H. chrysocarpa* Walsh, then it has priority.

The ancient Greeks and Romans associated this species of ivy with the cult of the god Dionysus (Bacchus) and poets were crowned by weaths made of its branches. Both Dioscorides and Pliny refer to *H. dionysias* and *H. poetica* rather than to *H. helix*.

Series 4. *Helix* Pojark. — Hairs stellate, 5–8(10)-rayed; fruit black, 6–10 mm across; leaves of sterile shoots very variable, entire and 3–5-lobed, often with predominance of sagittate leaves with large attenuate median lobe; distributed in the Mediterranean countries and Europe.

4. *H. helix* L. Sp. pl. (1753) 202, p.p. excl. var.; Ldb. Fl. Ross. II, 1, 375, p.p.; Boiss. Fl. or. II, 1090, p.p.; Shmal'g., Fl. I, 429, p.p.; Fedch. and Fler., Fl. Evr. Ross. 666, p.p. (excl. pl. taur.); Tobler, Gatt. Hedera, 17, p.p.; Nekrasova in Sov. bot. No. 6 (1933) 86, p.p. — *H. lobata* Gilib. Exerc. phyt. I (1792) 282. — *H. communis* S.F. Gray, Nat. Arrang. Brit. Pl. (1821) 401. — Ic.: Fedch. and Fler., *ibid.*, fig. 541; Tobler, l.c. fig. 1b, 2, 6–9; Hegi, III. Fl. V, 2, tab. 190–4a, f. 2286, 2289–2294. — Exs.: Fl. Germ. et Gall. exs. No. 1212.

Shrub; stems woody, branching, creeping on ground and stones or climbing to 3–20 m on trees and rocks by short adventitious roots on herbaceous juvenile shoots; stems rarely reach more than 15 cm in diameter; leaves wintergreen, coriaceous, glabrous, dark green, shiny



PLATE I. 1 — *Hedera caucasigena* Pojark., branches with flowers, part of sterile shoot, hair; 2 — *H. pastuchovii* G.Woron., branch with young fruits, part of sterile shoot, hair; 3 — *Aralia schmidtii* Pojark.

above, paler beneath, with asymmetrical reticular venation, to 10 cm long and as wide, very variable in shape: on sterile shoots usually broad with cordate base, from rounded-ovate to attenuate, 3–5(7)-angular-lobate, usually with broad or slightly enlarged median lobe, sometimes mixed with narrow sagittate leaves with markedly attenuate median lobe; veins often white or yellowish; on fertile branches leaves broadly ovate or rhombic-ovate to rounded, sometimes only the uppermost narrow, lanceolate (usually narrower in var. *baltica* Rehd.), rarely with 2 (or 1) symmetrical or asymmetrical lateral lobes. Umbels multiflorous, usually globular, 20–13 35 mm across, the terminal to 40 mm across, in var. *baltica* usually smaller, 17–23(25) mm across, mostly with 8–12 flowers; umbels on fairly thick 1.7–3.5 cm pedicels, with 2–3 squamiform leaves at base, solitary or arranged 3–10 in raceme; pedicels 6–13(17) mm, with small brown squamiform bracts at base; but for calyx-teeth all parts of inflorescence with dense grayish stellate 5–8(10)-rayed hairs, the 6–7-rayed pre-dominating; flowers bisexual, rarely unisexual, ovary semiinferior, calyx-teeth very short; petals fleshy, (3)3.5–4 mm long, 2–2.5 mm wide, brown outside with sparse stellate hairs, greenish inside, with longitudinal keel; stamens shorter than petals; styles short, 0.8–1.2 mm; ovary commonly with 5 (very rarely to 10) cells; fruit globular, 8–10 mm across, with 2–5, usually 2–3-seeds, reddish-purple when unripe, later dark brown, the blue-black ripe fruit persistent during the year. Fl. (August) (September–October (December), Fr. in the spring March–April (up to June) of the following year.

Shady places in gorges and ravines; broad-leaved, especially beech forests, in stony places and rocks, where it produces continuous cover and climbs high on trees. — European part: Balt. (including Ezel Island), U. Dnp., U. Dns. (the westernmost parts of these areas), Bes. Gen. distr.: Scand., southern part (in Norway up to 60°35'N, in Sweden up to 50°), Centr. and Atl. Eur., W. Med. (S. Europe), Bal.—As. Min. Described from Europe. Type in London.

Economic importance. *H. helix* has been cultivated since antiquity. In Central Europe as well it has been in cultivation so long, in fact, that it is difficult sometimes to determine its natural boundary. There are about 100 names of garden forms of *H. helix*, most of which appear to be synonyms; some presumably refer to other species of ivy *H. chryso-carpa* Walsh, *H. taurica* Carr., *H. scotica* A. Cheval.). The garden forms differ primarily by the shape (f.f. *digitata* Lodd., *palmata* C. Koch, *angularis* Hibb., *deltoides* Hibb., *hastata* hort., *tortuosa* Hibb. and others) and color of the leaves: white-, yellow- and sometimes pink-spotted or bordered, and also by the white or pink nerves (f.f. *elegantissima* Hibb., *marginata* Hibb., *variegata* hort., *Loweii* C.K. Schn. etc.). The white-fruited var. *leucocarpa* Seem., has been described by Theophrastus. Var. *arborescens* Loud. and var. *arborea* hort. (*H. arborea* Garsault) do not produce creeping shoots but form erect, low shrubs; they are obtained by rooting or grafting cuttings taken from fertile shoots. Also frequently cultivated is *H. helix* 14 var. *hibernica* Kirchn. (or *H. helix* var. *scotica* hort.) which produces a very high growth, with large, wide and thin leaves, and bears hairs with many rays (7–12). These characters place it close to

H. canariensis Willd. and some authors (Seeman) indeed regard it as a variety of this species or as one of its hybrids with *H. helix* (Schneider). Recently it has been described as *H. scotica* A. Cheval. Reported wild from Ireland.

Ivy is grown in gardens and parks in the southern part of the USSR, sometimes also in the Baltic area in addition to being a house and greenhouse plant. Covered in winter, it has been successfully cultivated on open ground in Kuibyshev, Moscow, and, according to Regel, also in Leningrad.

It is an excellent honey plant, especially valuable because it flowers in late fall. The honey obtained ("stoney honey") is white and very thick. The whitewood, with brown or gray veins, is light and porous and is used in turneries. The leaves are bitter, with a disagreeable taste; according to Wehmer they contain the glucosides saponin and hederine (helixin), inositol, carotene, formic and malic acids. There are indications that they may be used in place of soap. When injured, the stems exude a gummy juice which hardens in the air to form brownish encrustations (gummi or resina hedarae) which serves to prepare spirit varnish for painting in oil colors. In former times it was also of value in popular medicine. The bitter fruits are readily eaten by birds. They contain hederine, tannic acid, hederine-saponin, dyestuff, a high proportion of green-colored oil and butyric and linoleic acids.

Note. The eastern boundary of the natural distribution area of *H. helix* in the Soviet Union runs along its westernmost border. Here, especially in the more northern regions, like Belorussia [Pushcha] virgin forest and the Baltic area, *H. helix* usually remains sterile, blossoming and bearing fruit only rarely. Within its large European area, it displays a remarkable polymorphism, reflected in the presence of a series of obscure taxonomic status, some of which have been described as distinct species (*H. burgalensis* Sennen, *H. floribunda* Sennen). A curious deviation is shown by the form known in cultivation as *H. helix* var. *baltica* Rehder (Bail. Stand. Cyclop. horticult. II (1939) 1437), known only from the eastern boundary of the distribution area in the Baltic area and in Southern Scandinavia. Here the peduncles of the shoots are distinguished by their small leaves; the leaves are not more than 3–6 cm long, usually narrow, rhombic and lanceolate-rhombic, often pale green, 15 always entire, with smooth not undulant margins; umbels often few-flowered, small, 1.7–2.5 cm across, usually solitary. This distinctly reduced form, the most cold-resistant form under cultivation, is probably the only representative at the northeastern boundary of the species and requires further study.

5. *H. caucasigena* Pojark. in Addenda XV, 587. — *H. helix* M.B. Fl. taur.-cauc. I (1808) 174, pp.; Ldb. Fl. Ross. II, 1, 375, p.p.; Boiss. Fl. pr. II, 1090, p.p.; Tobler, Gatt. Hedera, 17; p.p.; Medvedev, Dr. i kust. Kavk. izd. 3 (1919) 171; Grossg., Fl. Kavk. III, 108, p.p.; Kolakovsk., Fl. Abkhaz. III, 177, non L. — *H. helix* subsp. *caucasica* Kleop. in sched. — Exs.: G.R.F. No. 1771 (sub *H. helix*).

Shrub; climbing liana to 25 m. Morphologically, it differs from *H. helix* L. as follows: the sterile shoots always bear, often predominantly, large oblong sagittate leaves with long attenuate median lobe and 2, rarely

4, short lateral lobes; the remaining leaves of sterile shoots are broadly cordate, usually angular-3-lobed, rarely 5-lobed, with a short median lobe; the lobes are usually obtuse, rarely acute; the leaves of the climbing sterile shoots are also usually 3-lobed, ovate or rounded-cordate; the fertile shoots bear entire leaves, up to 7(9) cm long and 4.5–6(6.5) cm wide, smaller than in *H. helix*, generally narrower, ovate, with truncate base or rhombic-ovate, with cuneate base, often mixed with narrower lanceolate and lanceolate-rhombic leaves, with flat or undulant margins. The inflorescence is longer and narrower, sometimes an oblong raceme of (3)5–12 umbels, sometimes umbels solitary; the umbels are smaller than in *H. helix*: the solitary terminal one 20–27(32) mm, the lateral ones (15)17–23(27) mm across, with few flowers, subglobular, rarely the terminal globular; pedicels 2–3.8 mm long, narrower, 0.6–0.8 mm thick; pedicels thin, 5–9(12) mm, often elongating in fruit to 8–15(18) mm; hairs of inflorescence not so dense, stellate, 5–6-rayed, with mixture of 7–8-rayed; flowers smaller, the petals 2–2.5 mm, sometimes to 3 mm long and 1.5 mm wide; fruit 5–9 mm across, usually with 2–4(5) seeds. Fl. September–November; ripe fruits in the spring and summer (April–June) of the following year. (Plate I, Figure 1.)

Forests along coastlines and low mountain belt, spreading or climbing trees, rocks, walls of ancient structures, hedges. — Caucasus: W. Cisc., W. Transc., E. Transc. (Teletskii Range, Kakhetia), S. Transc. (N. and W.). Gen. distr.: Bal.-As. Min. (Lazistan). Described from Yur'evskoe near Sukhumi (G.R.F. exs. No. 1771). Type in Leningrad.

16 Note. Reports of the widespread distribution of "*H. helix*," i.e., its Caucasian race *H. caucasigena*, throughout the entire Caucasus are erroneous for its occurrence in Ciscaucasia and W. Transcaucasia is very limited. It has been confirmed from Kakhetia and somewhat to the east, in Nukha, Teletskii Range near Tbilisi, and in N. Armenia (Dilizhan, Idzhevan). Herbarium specimens believed to come from Kirovabad and Lenkoran are apparently based on false determinations of *H. pastuchovii* and in part also of *C. chrysocarpa* (for Kirovabad). There are no wild specimens from Iran, where *H. helix* is erroneously shown for the north instead of *H. pastuchovii*.

H. caucasigena differs from *H. helix* and *H. taurica* by the small sessile umbels with thin pedicels, and small flowers. Together with *H. taurica* it differs from *H. helix* in the predominance of sagittate leaves on the sterile shoots: these are usually 5-lobed in *H. taurica*, 3-lobed in *H. caucasigena*.

6. *H. taurica* Carr. in Rev. hort. 62 (1890) 163; Haage u. Schmidt, in Verzeichn. (1862) apud Tobler, Gatt. Hedera (1912) 46, 133, pp. nom. nud. — *H. helix* M.B. Fl. taur.-cauc. I (1808) 174, pp. (quoad pl. taur.); Ldb. Fl. Ross. II, 1, 375, pp.; Boiss. Fl. or. II, 1090, p.p.; Shmal'g., Fl. I, 429, p.p.; auct. fl. taur. non L. — *H. poetarum* (?) var. *taurica* Tobler, l.c. 42. — *H. helix* var. *taurica* Tobler, l.c. sub tab. 15, 17, 18; Rehd. in Bail. Stand. Cyclop. Hort. II (1939) 1437. — Ic.: Tobler, l.c. f. 15, 16, 17, 18.

Shrub; juvenile shoots rather densely covered with stellate hairs; leaves coriaceous, shiny above, glabrous, often pale and even yellow-green, to 7 cm long, 5.5 cm wide, as in *H. caucasigena* on sterile creeping

shoots there predominate sagittate leaves with markedly elongated commonly 5-segmented median lobe, with well-developed lower pairs of lobes. The broad leaves of these shoots are 3-lobed or slightly angular, often entire, triangular or cordate; sterile climbing shoots with broadly cordate, usually entire, rarely with some slightly angular leaves; leaves of fertile shoots usually oblong-ovate or rhombic-ovate, long-acuminate with cuneate base, rarely wider, ovate, short-acuminate, with truncate base, always entire. Umbels often solitary, rarely in racemes of up to 5, pedicels 2–2.5 cm; entire inflorescence densely covered with stellate, 5–8-rayed hairs, 7–8-rayed predominant, rays often united for large stretch to produce squamiform hairs, or composed of 1–2 branches; there also occur coarse hairs with 3–5 rays, to 1 mm long; umbels usually globular, the solitary umbel terminal, 23–27 mm across, many-flowered with up to 38 flowers, the lateral smaller, 14–28 mm across, few-flowered; pedicels (4)5–10 mm, to 7–11 mm in fruit; calyx-teeth conspicuous, petals ovate, 3–4 mm long, 1.8–2.5 mm wide; fruit black, 6–10 mm across. Fl. September–October, Fr. February–September (to June of the following year).

Northern and southern slopes of mountain forests, shady places, climbing on trunks of trees, rocks and stones.— European part: Crim. Gen. distr.: Bal.-As. Min. (Dobrudzha). Described from Oreanda near Yalta. Type lost.

Economic importance. As in preceding species it has been under cultivation for a long time, mainly as *H. helix* var. *taurica* hort.

Note. Tobler, who devoted much time to the study of Crimean ivy, stressed in his monograph the difference in character of its pubescence as compared with the European *H. helix* L. The similarity with *H. chrysocarpa* Walsh in the shape and color of the leaves led him to suggest that the Crimean ivy was related to this species, as reflected in the name he proposed for it: *H. poetarum* (?) var. *taurica* Tobl. He even surmised that the fruits are yellow, because the juvenile fruits of both *H. taurica* and *H. chrysocarpa* lacked anthocyan. Yet he was wrong because the fruits of Crimean ivy, as well as those of *H. helix*, are black, and the former should therefore be regarded as a geographical race. Rehder's argument that Crimean ivy was a hybrid (*H. colchica* × *H. helix*) is quite fortuitous.

Genus 933. **ECHINOPANAX** * Dcne. et Planch.

Dcne. et Planch. in Rev. hort. 4, sér.III (1854) 105.— *Panax* 2 *Oplopanax* Torr. et Gr. Fl. N. Amer. I (1840) 648.— *Oplopanax* Miq. in Ann. Mus. Bot. Lugd.-Bat. I (1863–1864), 16

Flowers bisexual and staminate, monoecious, umbels in forming raceme (rarely slightly branching panicle); calyx of (4)5 small teeth or an inconspicuous border; petals valvate in bud; styles 5, free or connate for half their length; ovary 2-locular; fruit fleshy, with laterally flattened double drupe. Shrubs, stems not branching or slightly so, densely covered with acicular prickles.

* From the Greek *echinos* — prickles, and *Panax* — name of the genus.

18 Besides *E. elatum* Nakai, 2 species: *E. japonicum* Nakai in Japan, *E. horridum* Dcne. et Planch., in Western North America.

1. *E. elatum* Nakai in Journ. Coll. sc. Tokyo, XXVI, 1 (1909) 276; Kom. and Alis., Oprod. rast. Dal'nevost. kr. (1932) 785.— *Panax horridum* Ldb. Fl. Ross. II, 1 (1844) 375, excl. non Sm.— *E. horridum* Harms in E.— P. Pflanzenfam. III, 8 (1898) 34, p. p.; Kom., Fl. Man'chzh III, 116; C. K. Schn. Laubholz. II, 430, p. p. non Dcne. et Pl.— *Oplopanax elatum* Nakai. Fl. sylv. koreana, XVI (1927) 38; Nekrasova in Sov. bot. No. 6 (1933) 85.— Ic.: Nakai in Journ. Coll. sc. Tokyo, XXVI, 1 (1909) tab. XV; Fl. sylv. koreana, XVI, tab. XI.

Shrub, usually about 1 m, rarely to 2–3 m high, with long creeping rhizome and erect unbranched or only slightly branched stem. Bark pale gray, with abundant brittle acicular 3–10 cm prickles; petioles 6–16 cm, densely covered with short prickles, leaves large, 15–30 cm across, glabrous or with scattered prickles above, prickly along veins below, shallowly 5–7-lobed, with broad acute or obtuse lobes, with acute double teeth, fringed with prickly hairs. Inflorescence axillary 7–18 cm long, peduncles 2.5–6 cm, densely covered with long rust-colored hairs and prickles; umbels small, 9–13 mm across, in oblong raceme or a slightly branching panicle at tips of main and lateral axes (second order branches usually with one, rarely 2–4 umbels); pedicels 2–10 mm, with dense long yellow hairs; bracts early deciduous, pink, pectinately incised; calyx-teeth hardly discernible, petals lanceolate-triangular; styles usually free, rarely more or less connate; fruit yellow-red, 7–12 mm long. Fl. June–July, Fr. from September. (Plate II, Figure 1.)

Upper mountain forest belt, small thickets or groups.— Far East: Uss., southern part. Gen. distr.: Korea. Described from Korea. Type in Tokyo.

Economic importance. A unique ornamental shrub that deserves to be cultivated. Its N. American vicariant *E. horridum* Dcne. et Planch. is seldom cultivated.

Note. In 1927 Nakai proposed *Oplopanax* Miq. (1863) to replace the earlier *Echinopanax* Dcne. et Planch. (1854), claiming that the authors of *Echinopanax* had ignored the fact that it was based on *Panax horridum*. *Oplopanax elatum* Nakai should therefore be discarded in favor of *Echinopanax elatum* Nakai.

19 Genus 934. **ACANTHOPANAX** * Seem.

Seem. in Journ. Bot. V (1867) 238.— *Panax* subgen. *Acanthopanax* Dcne. et Planch. in Rev. hortic. 4 sér. III (1854) 105.

Flowers bisexual or polygamous (dioecious or monoecious), in solitary umbels or arranged in racemiform or umbelliform inflorescences; calyx of 5 small teeth, petals 5, valvate in bud, styles 2, free or more or less connate, ovary 2-locular; fruit berry-like, a double-triangular laterally flattened drupe; pedicels not jointed. Shrubs, rarely trees, not spiny or with prickly branches and stem; leaves palmately compound.

* From the Greek *acantha* — thorn, spine, and *Panax* — name of the genus.

About 20–25 species, Southeast Asia including the Philippines.

1. *A. sessiliflorum* (Rupr. et Maxim.) Seem. in Journ. of Bot. V (1867) 239; Harms in E. – P. Pflanzenfam. III, 8 (1898) 50; Kom., Fl. Man'chzh. III (1905) 117; C.K. Schn. Laubholzsk. II (1909) 429. – *Panax sessiliflorum* Rupr. et Maxim. in Bull. Acad. Sc. Pétersb. XV (1857) 133; Maxim. Prim. fl. amur. 131. – *Cephalopanax sessiliflorum* Baill. in Adansonia, XII (1878) 149. – Ic.: Gartenflora, XI (1862) tab. 369; Kom. and Alis., Opred. rast. Dal'nevost. kr. II (1932) tabl. 239; Nakai, Fl. sylv. koreana, XV (1927) tab. II.

Shrub, to 3.5 m high, branching, with gray longitudinally splitting bark and yellowish-gray smooth shoots or covered with sparse prickles; petioles to 12 cm, glabrous or sparingly pubescent, often with solitary prickles; leaves palmately compound, the 3–5 leaflets sessile on hairy, 5–12 cm petioles (subglabrous at tip); leaflets elliptic, cuneate, short apex mucronate, 5–17 cm long, 2.5–7 cm wide, thin in shady localities, thick in exposed localities, glabrous above, bristly-hairy, sometimes with few prickles beneath along veins; margins usually acutely bidentate. Flowers in subcapitate umbels commonly polygamous-monoecious, rarely all bisexual, on very short peduncles, umbels solitary or in dichasia of 2–6 at tips of branches; pedicels and sepals lanate-tomentose, styles connate nearly to tip; fruit ellipsoidal-ovoid, black, a laterally strongly compressed ventrally-flattened double drupe. Fl. August, Fr. from September. (Plate II, Figure 3.)

Wooded riverbanks and streams, forest edges and clearings, islands, elevated localities in inundated valleys, meadows, solitary or in small groups. – Far East: Ze.-Bu, Uda, Uss. Gen. distr.: Jap.-Ch. (Manchuria, Korea, N. China). Described from Amur. Type in Leningrad.

Economic importance. Cold-resistant ornamental shrub.

Note. The taxonomy and relationships of *Acanthopanax* have not yet been worked out. Some taxonomists, including Harms, in his review of *Acanthopanax* (1919) regard it as comprising *Kalopanax* and *Eleutherococcus*.

A. sessiliflorum belongs to the oligotypic E. Asian section *Cephalopanax* (Baill.) Harms (in Mitt. d. deutsch. dendr. Gesellsch. XXVII (1918) 14. – *Cephalopanax* Baill. in Adanson. XII (1878) 149, non Saporta), characterized by very short peduncles yielding capituliform umbels, forming more or less umbelliform terminal racemes, by the tomentose pubescence of calyx and pedicels, and by the bi-carpellary ovary.

Genus 935. **ELEUTHEROCOCCUS*** Maxim.

Maxim. in Mém. présent. Acad. Sc. Pétersb. IX (1859) 132. – *Acanthopanax* sect. *Eleutherococcus* Harms in E. – P. Pflanzenfam. VIII, 8 (1898) 50

Flowers bisexual or unisexual, staminate and pistillate, polygamous, in umbels; umbels solitary or 2–5 at tips of shoots; pedicels not jointed, thin, rather long; calyx of 5 (4–6) small teeth; corolla of 5 (4–6) petals,

* From the Greek *eleutheros* – free, *coccon* – seed.

valvate in bud, styles 5 (rarely 3-4 or 6-7), adnate to tube for entire length; ovary 5-locular (rarely 3-4- or 6-7-locular); fruit berry-like, a strongly laterally flattened double-drupe. Shrub, usually with prickly shoots and palmately compound leaves.

About 15 species in E. Asia, from Japan to the Himalayas.

1. *E. senticosus* (Rupr. et Maxim.) Maxim. in Mém. présent. Acad. sc. Pétersb. IX (1859) 132; Fr. Schmidt in Mém. Acad. Sc. Pétersb. VII sér. XII, 2 (1868) 47; Kom., Fl. Man'chzh. III (1905) 119; Kom. and Alis., Oprod. rast. Dal'nevost. kr. II, 786. — *Hedera? senticosa* Rupr. et Maxim. in Bull. Acad. Sc. Pétersb. XV (1856) 134. — *Acanthopanax senticosus* Harms in E. — P. Pflanzenfam. III, 8 (1898) 50; Makino et Nemoto, Fl. Jap. ed. 2 (1931) 817. — *E. koreanus* Nakai, Fl. sylv. koreana, XV, (1927) 32. — Ic.: Kom. and Alis., ibid., tabl. 240; Nakai, l.c. tab. VII.

Shrub, to 2 m, rarely to 4-5 m high, with light gray bark; shoots light brown, usually densely covered with thin brittle prickles curved below, sometimes prickles wanting (f. *inermis* Kom.); petioles to 10 cm, 21 glabrous or with sparse rufous hairs, with or without solitary prickles; leaves of 5 leaflets, these oboval or elliptic, cuneate, short-acuminate or tapering to more or less long mucro, thin, adult specimens glabrous or more or less densely covered with short bristly hairs, with rufous hairs below along nerves; margins acutely bidentate; upper leaflets larger than lower, 7-12.5 cm long, 3-7 cm wide, the petiolules longer, 1-2 cm, covered with dense rufous hairs. Umbels on long stalks, single, terminal but usually 3-4, the distal commonly solitary, fertile, larger and more multiflorous, with peduncles to 8 cm; pedicels (6) 10-20 mm, glabrous or hairy only at base; flowers polygamous-dioecious; petals soon deciduous, yellowish in pistillate flowers, light violet in bisexual and staminate flowers; stamens 5, styles connate, 5 free short stigmas; fruit subglobular, black, 7-10 cm long, a pentapartite drupe with strongly flattened parts. Fl. July-August, Fr. from September. (Plate II, Figure 2.)

Mixed and coniferous mountain forests forming small undergrowths or groups in thickets and edges; a common component of undergrowths. Rarely in oak groves at foot of cliffs and ravines, more rarely in high-forest riparian woodland. — Far East: Ze.-Bu., Uda, Uss., Sakh. Gen. distr.: Jap.-Ch. (Manchuria, Korea, N. China (Hopeh), Japan. Described from Amur. Type in Leningrad.

Economic importance. An ornamental shrub deserving wide cultivation.

Note. Highly polymorphic in several characters, the range of variations presumably comprising *E. koreanus* Nakai, from NW Korea. The diagnostic characters (dotted lenticels on shoots, sparse pubescence of umbel base and long pedicels) also mark Russian material from the different parts of the distribution area of *E. senticosus*. Many of the Sakhalin specimens markedly deviate from the type by the large broad teeth of their leaves and the more dense, bristly pubescence of their upper side.

Genus 936. **KALOPANAX** * Miq.

Miq. in Ann. Mus. bot. Lugd.-Batav. I (1863-1864) 16, p.p. - *Acanthopanax* sect. *Kalopanax*
Harms in Mitt. deutsch. dendrol. Gesellsch. XXVII (1918) 31

22 Flowers in globular long-stalked umbels, forming terminal umbelliform inflorescences; pedicels not jointed; calyx of 5(4) small teeth; petals 5(4), valvate in bud; styles 2, connate to tip; ovary 2-locular; fruit a double drupe with fleshy exocarp, each part trihedral, with cartilaginous endocarp. Trees, with simple palmately lobed or partite leaves, branches with strong prickles. One species.

1. *K. septemlobum* (Thunb.) Koidz. in Bot. Mag. Tokyo, XXXIX (1925) 306. - *Acer septemlobum* Thunb. Fl. jap. (1784) 161. - *A. pictum* Thunb. in Nova Acta Reg. Soc. sc. Upsal. IV (1784) 40, non in Fl. jap. (1784). - *Panax ricinifolium* S. et Z. in Abh. Acad. Münch. IV, 2 (1845) 199. - *Tetrapanax ricinifolium* C. Koch. in Wochenschr. f. Gärtn. u. Pflanzenk. II (1859) 371. - *Kalopanax ricinifolium* Miq. in Ann. Mus. bot. Lugd.-Batav. I (1863-1864) 16; Fr. Schmidt in Mém. Acad. Sc. Pétersb. VII sér. XII, 2 (1868) 140; Harms in E.-P. Pflanzenfam. III, 8 (1898) 51; Kom., Fl. Man'chzh. III, 122; Kudo in Jap. Journ. Bot. II, 269; Kom. and Alis., Opred. rast. Dal'nevost. kr. II, 786; Vorob'ev in Tr. Dal'nevost. bazy AN SSSR, ser. biol. 1 (1948) 37. - *Brassiopsis ricinifolia* Seem. in Journ. of Bot. II (1864) 291. - *Acanthopanax ricinifolium* Seem. in Journ. of Bot. VI (1868) 140; Miyabe, Fl. Kuril. Isl. (1890) 237; C. K. Schn. Laubholz. II (1909) 429. - *Aralia maximowiczii* Van Houtte, Fl. d. Serres, XX (1874) tab. 2067. - *Acanthopanax acerifolium* Schelle in Mitt. deutsch. dendrol. Gesellsch. XVII (1908) 217. - *Acanthopanax ricinifolium* var. *Maximowiczii* Koehne in Mitt. deutsch. dendrol. Gesellsch. XXII (1913) 145. - *Kalopanax autumnalis* Koidz. in Bot. Mag. Tokyo, XXXVII (1923) 58. - *Kalopanax pictum* Nakai, Fl. sylv. koreana, XVI (1927) 34; Nekrasova in Sov. bot. No. 6 (1933) 92. - Ic.: Nakai, l. c. tab. VIII-X; C. K. Schn. l. c. f. 289 v-z, f. 291 b-c; Miyabe et Kudo, Ic. forest trees Hokkaido, III (1930) tab. 78.

Tree, usually 10-12(23) m high, with weakly branching erect stem ca. 10 cm across, bark gray, splitting longitudinally; shoots and branches usually sparsely covered with strong flat prickles to 1-2 cm long, strongly dilated at base, leaves long-petiolate, large, to 9-26(35) cm long, 11-35(40) cm wide, palmately 7- (rarely 5- or 9-) lobed, rarely deeply partite (var. *maximowiczii* (Koehne) Pojark.), glabrous but for barbules beneath base of midrib; lobes from triangular and ovate-triangular to lanceolate-oval, with appressed serrate margins. Flowers in long-pedicelated globular umbels, to 2-2.2 cm across, these numerous (to 100), forming subglobular umbelliform or corymbiform terminal inflorescence, to 30 cm across; pedicels 5-9 mm; petals yellowish-green, oval-elliptic, anthers pink; 23 fruit 4-5 mm across, globular, a dorsally keeled double drupe, with 2 furrows on flat ventral side. Fl. July-August, Fr. middle of September.

Edges of mixed and broadleaved forests, high open forests, singly or in small groups. - Far East: Uss., Sakh. S. Kuriles (Kunashir and Iturup islands). Gen. distr.: Jap.-Ch. (Japan to Ryukyu inclusively, Manchuria, Korea, China). Described from Japan. Type in Leningrad.

* From the Greek *calos* - handsome, *Panax* - name of the genus.

Economic importance. A beautiful ornamental tree with fine-grained, lightweight, soft, golden-yellow wood ("white nut") of *K. septemlobum*, easily polished and yields a handsome veneer, very valuable for furniture-making and turning, also in Japan. Its resonant qualities make it suitable for the production of musical instruments. Deserves cultivation for export, but almost neglected in the USSR. It has been successfully grown in the Central zone and near Leningrad.

Note. It appears that in the USSR there occur only var. *typicum* (Nakai) Pojark., with glabrous leaves, and var. *magnificum* (Nakai) Pojark., its leaves covered beneath with crisp, simple or multipartite hairs, which do not appear in our material.

This species has for many years been known as *K. ricinifolium* Miq., until Koidzumi in 1925 renamed it *K. septemlobus* Koidz., going back to Thunberg, who, assuming it to be a maple, because of its leaves, had described it in 1784 as *Acer septemlobum* (Flora japonica). In 1927 it was once again renamed, this time *K. pictum* Nakai, referring to Thunberg's *Acer pictum* Thunb. (1783). However, Nakai was wrong, because Vol. IV of "Nova Acta Reg. Soc. Upsal.," to which he refers, is dated 1784, just like "Flora japonica." It is difficult to decide now which of these was published first. It is true in "Flora japonica" Thunberg refers to "Kaempferus illustratus, II," in which *Acer pictum* Thunb. is published as of 1783, but this only confirms that in publishing two works simultaneously Thunberg expected that "Kaempferus illustratus," included in the above-mentioned Vol. IV of "Nova Acta Reg. Soc. Upsal.," would be published in 1783, which however did not happen. Thus, *Acer pictum* Thunb. does not have priority over *Acer septemlobum* Thunb. and since the epithet *septemlobum* was established for *Kalopanax ricinifolium* before Nakai reintroduced for it the epithet *pictum* it
24 is the former that should be retained. We should add that for nearly 150 years, *Acer pictum* Thunb. has been attached to a species of maple because in "Flora japonica" a species of maple was really described as *Acer pictum* Thunb. As we could not ascertain where this name was first used, in "Flora japonica" or in "Nova Acta Upsal. IV", there is no reason why the name of the maple *Acer pictum* Thunb. should not be retained.

Genus 937. **ARALIA** * L.

L. Sp. pl. ed. 1 (1753) 273

Flowers bisexual or staminate, with abortive ovary, commonly 5-merous, rarely 4- or 6-merous; calyx of small teeth, petals imbricate in bud, styles free or more or less connate, ovary (2)5-6-locular; flowers in umbels, these usually arranged in compound paniculate inflorescence, rarely in simple raceme; pedicels jointed; fruit berry-like, globular, (5)6-faceted, with fleshy exocarp, the 5-6 parts laterally flattened with cartilaginous endocarp. Small trees with nearly simple stem or high perennial herbs usually bearing prickles; leaves compound, twice or thrice pinnate.

* Canadian Indian name of the species.

About 35 species, mostly in subtropical or tropical climates, in south-eastern Asia, the Sulu Archipelago, as well as in North and Central America.

In the USSR *Aralia* is known from the Lower Cretaceous to the Sarmatian but the generic relations of some fossils is doubtful, because of their similarity with *Sassafras*. *A. lucifera* Krysht. and *A. kolyensis* Krysht. are the oldest dicotyledonous plants in the USSR. *Aralia baieriana* Heer, Upper Cretaceous, Yenisei (Simonova). — *A. daphnophyllum* Velen., Lower Senomanian, Daralagez. — *A. firmifolia* Vasil., Eocene, Karakum (Lake Er-Oilan-Duz). — *A. kolyensis* Krysht., Lower Cretaceous, Lena-Kolyma (Zyryanka River). — *A. korovinii* Jarm., Upper Cenomanian — Lower Turonian, Kyzyl-Dzhar (Kazakhstan). — *A. lucifera* Krysht., Aptian (?), Ussuri (Sitsa River, Suchan River). — *A. polevoii* Krysht., Cenomanian-Turonian, Sakhalin (Mgachi, Petrovskii mine, Arkovo-Rudnik). — *A. cf. polymorpha* Newb., Upper Cretaceous (Danian), western shore of Kamchatka. — *A. cf. Saportana* Lesq., Danian stage (Bureya Tsagan), Bureya Belogor'ya on Amur. — *A. schmalhauseni* Pimen., Eocene, U. Dnp. (Mogil'no). — *A. tikhonovichii* Krysht., Cenomanian-Turonian, Sakhalin (Mgachi). — *A. tschulymensis* Heer, Upper Cretaceous, Yenisei (Simonova, Chulym River). — *Aralia* sp., Lower Oligocene, Aral-Caspian (Dzhaman-Kaindy), Upper Oligocene, Lake Balkhash area (Ashutas) and Sarmatian, Black Sea (Krynka River); Mio-Pliocene, Ob region (Kireevskoe, seeds, 2 species); Pliocene deposits, Kireevskoe on Ob; Middle Oligocene, northern Aral area.

- 25 1. Trees with stem bearing prickles; umbels in large branching paniculate inflorescences, these united in large terminal umbel (section 1. *Dimorphanthus* Miq.) 2.
- + High perennial herbs, without prickles; inflorescence a terminal panicle (section 2. *Herbaralia* Nakai) 3.
2. Leaflets usually oblong-ovate, with small teeth, conspicuously petioled, petioles 2–5(8) mm; panicles of (1)3–5(7) lateral umbels, the axes of the second order tightly arranged, 2.5–10 cm long 2. *A. mandschurica* Rupr. et Maxim.
- + Leaflets usually broadly ovate, with large teeth, sessile, rarely on short, 1–2(4) mm, petiolules; panicles of (1–3)5–15 lateral umbels, axes of the second order sparsely arranged to 13–15 mm long 1. *A. elata* (Miq.) Seem.
3. Inflorescence dense, with tightly arranged axes of the second order 2.5–6(8) cm long, with 3–8 axes of the third order which frequently bear 1–3 axes of the fourth order (if shorter: inflorescence on axes of second order — panicle of 6–14 umbels); umbels of bisexual flowers 15–23 mm across; styles connate for $\frac{1}{3}$ – $\frac{1}{2}$ 4. *A. continentalis* Kitagawa.
- + Inflorescence less branching, usually without axes of fourth order, the axes of the second order bearing simple racemes of 2–4 umbels; styles connate but not beyond middle 4.
4. Umbels of bisexual flowers 17–28(30) mm across; axes of second order loosely arranged, 3–15 cm (usually 5–9 cm), inflorescence not dense 3. *A. cordata* Thunb.

- + Umbels of bisexual flowers 20–35(40) mm across; axes of second order 3–6.5 cm, clustered or forming 3–5 multirayed whorls
 5. *A. schmidtii* Pojark.

Section 1. DIMORPHANTHUS Miq. Fl. Ind. Bat. I (1855) 749. –

Dimorphanthus Miq. Comment. phytogr. (1840) 95, pro gen. – Low trees, the stems beset with prickles; inflorescence umbel-like, of large terminal panicles on stem or branches.

1. *A. elata* (Miq.) Seem. in Journ. of Bot. VI (1868) 134; Harms in E. – P. Pflanzenfam. III, 8 (1897) 57; Kudo in Jap. Journ. Bot. II (1925) 269. – *Dimorphanthus elatus* Miq. Comment. phytogr. (1840) 95. – *Aralia canescens* S. et Z. in Abh. Akad. Münch. IV, 2 (1845) 202. – *A. spinosa* 26 Miq. in Ann. Mus. Bot. Lugd.-Bat. I (1864) 7, p. p. non L. – *A. chinensis* var. *canescens* et var. *glabrescens* C. K. Schn. Laubholz. II (1909) 431. – Ic.: Miq. Comment. phytogr. (1840) tab. 12; Miyabe et Kudo, Ic. forest trees Hokkaido, III (1931) tab. 80; Tarasaki, Ic. fl. jap. (1931) tab. 1466.

Small tree or shrub, 3–7 m high; stem erect, 12–20 cm across, simple or with few short terminal transverse branches, bark dark brown, with more or less dense short sturdy prickles, rarely almost without prickles; leaves on long petioles spreading, clustered near stem apex, large, 40–80 cm long, twice pinnately compound, with 2–4 pairs of opposite compound lobes of the first order, bearing 3–13 leaflets and few distal pairs of simple leaves sometimes divided into 1–2, usually asymmetrical lobes; leaf petiole, rachis and petiolules very densely or only slightly pubescent, with brownish yellow hairs, often bearing prickles, these short on rachis and petiolules, longer, to 10–12 mm in axils of leaflet lobes; leaflets sessile or on very short (1–2(4) mm) petioles, 3–13 cm long, 1.4–6(7.5) cm wide, thick, oblong-ovate, rarely elliptic or broadly ovate, usually long-acuminate, always produced into mucro, usually long, base rounded or rounded-cuneate, commonly asymmetrical, sometimes leaves more or less turned up, unequally acutely toothed, the upper side bright green, more or less rugose, glabrous or with scattered bristly hairs, the lower pale, glaucous, with continuous yellowish velutinous pubescence, the hairs denser and longer along veins (var. *canescens* Pojark. comb. nov. = *A. spinosa* var. *canescens* Fr. et Sav., *A. spinosa* var. *elata* Sarg., *A. chinensis* var. *elata* Rehd., *A. chinensis* var. *canescens* C. K. Schn., non Koehne) or bristly, confined to veins (var. *glabrescens* Pojark. comb. nov. = *A. canescens* S. et Z., *A. spinosa* var. *glabrescens* Fr. et Sav., *A. spinosa* var. *canescens* Sarg., non Fr. et Sav., *A. chinensis* var. *canescens* Koehne, *A. chinensis* var. *glabrescens* C. K. Schn.). Inflorescence usually in shape of a large panicle, to 60 cm long (sometimes 12–25 cm), forming terminal umbel at tip of stem; panicles thin, axes of second order remote, alternate or in part approximate in pairs; in contrast to *A. mandshurica* these rarely have terminal umbel and the panicles are longer, to 13–15 cm, in addition to terminal umbel of bisexual flowers there are (1.3)5–15 lateral umbels (bisexual or staminate flowers), the flowers sessile on 0.5–2.2 cm long axes of third order, bearing 3–8 small tuberculate mucronate bracts, 1 to 3 of these subtend very short axes of fourth order, bearing small

umbels of staminate flowers; umbels of bisexual flowers 12–17(22) mm across, the staminate umbels 5–9 mm; pedicels of the former (3)5–8(10) mm, of the latter 1.5–3 mm; all axial parts of inflorescence densely covered with spreading yellow hairs, flowering markedly staggered, with considerable intervals between umbels of different orders; calyx of 5 broadly triangular glabrous acute teeth; petals yellowish-white, oblong-ovate, 2.3 mm long, 1.25 mm wide; stamens longer than petals, anthers ovoid; ovary glabrous, in bisexual flowers ovoid-cylindrical, in the staminate broadly obconical; styles 5, rarely 6, 1–5 mm, free or connate below, stigma reddish; fruit 5–6 mm across, commonly a 5-partite drupe. Fl. August, Fr. October.

Forests, on rich, well-moistened soil. — Far East: Sakh. (S. and Kurile Islands, southern islands, northern boundary on Urup Island). Described from Japan. Type in Holland?

Economic importance. As in the preceding species.

Note. Some specimens from Sakhalin are typically var. *glabrescens* (Fr. et Sav.) Pojark., with leaves pubescent only along nerves, and stem and petioles strongly spiny. If *A. elata* (Miq.) Seem. and *A. canescens* S. et Z., are distinguished — though there are insufficient grounds for this — var. *glabrescens* should be called *A. canescens* S. et Z., as var. *canescens* (Fr. et Sav.) Pojark. is the type of *A. elata*. Most specimens from Sakhalin differ from the Japanese plants in having broader leaves, with involute margins. All have small, strongly impoverished inflorescences 12–18(25) cm long, with very short (1.5–5 cm) second order branches, mostly with single terminal, rarely with 1–3 lateral umbels. In contrast to the impoverished inflorescences of the Japanese plants, the Sakhalin specimens are distinguished by the crowded axes of the second order, in the Japanese plants they are rarely remote.

2. *A. mandshurica* Rupr. et Maxim. in Bull. phys.-math. Acad. Sc. Pétersb. XV (1857) 134; Seem. in Journ. of Bot. VI (1868) 134; Kom. Fl. Man'chzh. III (1905) 123; Kom. and Alis., Opred. rast. Dal'nevost. kr. II, 786. — *Dimorphanthus mandshuricus* Rupr. et Maxim. in Mém. présent. Acad. Sc. Pétersb. IX (1859) 133. — *D. elatus* Rgl. et Maack in Mém. Acad. Sc. Pétersb. VII sér. IV, 4 (1861) 74, non Miq. — *Aralia chinensis* var. *mandshurica* Rehd. in Bailey, Cycl. Am. Hort. I (1900) 82; C. K. Schn. Laubholzk. II, 431. — *A. chinensis* Nakai in Journ. Coll. sc. Tokyo, XXVI, 1 (1909) 278, non L. — *A. elata* Nakai, Fl. sylv. koreana, XVI (1927) 46 (excl. synonym. 1, 2, 5, 7, 8, 9, 10); Nekrasova in Sov. bot. No. 6 (1933) 95, p. p. non Seem. — Ic.: Nakai, l. c. tab. XVI.

28 Shrub, small tree, 1.5–3 m, rarely to 4–5 m high, in general habit very similar to *A. elata*. Stem with numerous prickles; leaves to 1 m long [?] twice, rarely thrice pinnately compound with 2–4 pairs of first order lobes, in contrast to *A. elata* these have 5–9(11) leaflets usually with developed 2–5(8) mm petiolules; petioles, rachis and petiolules of leaves not densely pubescent, often with strong short prickles at base of lobes, some leaflets with rather long prickles, to 1 cm; leaflets to 18 cm long, 8 cm wide, rarely elliptic, usually ovate, pale green above, with conspicuous network of veins, not rugose, glabrous or with bristly hairs usually confined to veins, rarely over entire surface, light glaucous beneath, midribs with bristly hairs to subglabrous; teeth usually coarser. Inflorescence not as



PLATE II. 1 - *Echinopanax elatum* Nakai; 2 - *Eleutherococcus senticosus* (Rupr. et Maxim.) Seem.; 3 - *Acanthopanax sessiliflorum* (Rupr. et Maxim.) Seem.; 4 - *Panax schin-seng* Nees v. Esenb.

large, denser; panicles to 45 cm long, arranged in terminal groups of (4)6–8 forming an umbel or corymbiform umbel. Axes of the second order more numerous and more crowded than in *A. elata*, often some alternate, the rest approximate in pairs, or 4–5 in lateral half whorls, rarely in whorls, usually forming 5–8-rayed terminal umbel; axes of second order 2.5–10 cm shorter than in *A. elata*, with terminal umbel of bisexual flowers, and 1–5(7) lateral umbels of bisexual, rarely staminate flowers; umbel-bearing third order axes short, 5–13 mm, with 1–3(4) small brown bracts, which only rarely produce fourth order axes bearing 1–3 small, 3–5(6), often 1–2-flowered umbels; umbels of bisexual flowers 12–20 mm of staminate 5–13 mm across; pedicels of the former 4–8 mm of the latter 2–5 mm; all axial parts of inflorescence densely covered with spreading yellow flexuous hairs; calyx of 5 triangular small teeth, calyx and ovary glabrous; ovary of bisexual flowers ovoid, of staminate flowers broadly obconical; petals oval-triangular, styles 5, free from base; fruit 3–5 mm across, blue-black, with a 5-partite drupe. Fl. July–August, Fr. middle of September.

- Undergrowth in mixed and coniferous forests, preferably in bright
 31 localities, glades, edges, clearings, felled areas, solitary or in small groups. – Far East: Ze.-Bu., Uda, Uss. Gen. distr.: Jap.-Ch. (Manchuria and Korea). Described from the southern course of the Amur River and from Khekhtsir Range. Type in Leningrad.

Economic importance. A highly ornamental tree, resembling the palm in its large inflorescence of snow-white flowers. Though fairly cold-resistant, in central Russia it is killed by frost, regenerating from shoots. Very rarely cultivated.

Section 2. HERBARALIA Bakai, Fl. sylv. koreana, XVI (1927) 46. – High perennial herbs, with fleshy root and simple stems; inflorescence a large terminal panicle, sometimes with small accessory inflorescences in axils of upper leaves.

3. *A. cordata* Thunb. Fl. jap. (1784) 127; Miq. in Ann. Mus. Bot. Lugd.-Bat. I (1864) 9; Makino et Nemoto, Cat. pl. jap. (1914) 134; Kudo in Jap. Journ. Bot. II (1925) 269; Vorob'ev in Tr. Dal'nevost. bazy AN SSSR, ser. obshch. 1 (1948) 37. – *A. edulis* Sieb. et Zucc. Fl. jap. I (1835) 57. – *Dimorphanthus edulis* Miq. Comment. phytogr. (1840) 96. – ? *A. racemosa* var. *sachalinensis* Miyabe, Fl. Kuril. Isl. (1890) 227, non Rgl. – Ic.: Sieb. et Zucc. l.c. tab. 25; Tarasaki, Ic. fl. japon. (1933) tab. 1249.

Perennial high herbaceous plant, to 1.25 m, with simple not branching stem, subglabrous or more or less densely covered with thick hairs when juvenile; root thick, fleshy, aromatic; leaves large, to 50 cm long, long-petioled, twice, rarely thrice pinnately compound, the imparipinnate 3–5 lower compound lobes of 3–5(7) leaflets decreasing to 2–3 pairs of simple leaflets in distal part of leaves; leaflets on short, 1.5–5(10) petioles, to 20 cm long, 9(12) cm wide, usually oblong-ovate, rarely subelliptic, the terminal usually wider, with rounded-truncate or cordate, often asymmetrical base, gradually acuminate and produced to a mucro, dark green above, glabrous or sometimes rather densely covered with short bristly hairs, paler

beneath, the large and the smallest leaflets with short bristly hairs along veins; margin with acute, simple, partly emarginate teeth. Large, terminal, paniculate inflorescence to 45–55 cm long sometimes with small accessory inflorescences, these usually a simple raceme of 5–9 umbels, subtended by upper leaves; main inflorescence not dense, slightly branching, usually not branched beyond third order; distal second order axes usually forming 3–5 rayed terminal umbel, the others alternate, 2–5 cm apart, sometimes 32 in pairs, sometimes in threes, 3–15 cm (usually 5–8 cm long); below terminal umbel of bisexual flowers, second order axes often with 1–2, rarely 3 lateral umbels, mostly of staminate flowers, on short 0.8–1.5 cm third order axes which very rarely bear 1–2 small lateral umbels; umbels terminating second order axes 1.7–2.8(3) cm across, on third (fourth) order axes smaller, 1.4–1.8 mm across; axial parts of inflorescence densely covered with yellow, spreading, more or less crisp hairs; pedicels of bisexual flowers 7–14(16) mm, of staminate 1.5–7 mm; calyx of 5 small acute triangular teeth; petals triangular-oval to nearly lanceolate, 2.25–2.5 mm long, stamens longer than petals, with broadly elliptic anthers; styles 5, connate to middle; fruit black, small, 3–4 mm across. Fl. July–September, Fr. from September.

Clearings, forest edges, mountain slopes. — Far East: Sakh. (three southern of the Kurile Islands). Gen. distr.: Jap.-Ch. (Japan). Described from Japan. Type in Uppsala.

Economic importance. In Japan the roots are eaten and also used for medical purposes. An ornamental perennial effective when planted singly or in small groups.

4. *A. continentalis* Kitagawa in Bot. Mag. Tokyo, XLIX (1935) 228. — *A. cordata* Kom., Fl. Man'chzh. III (1905) 125, non Thunb.; Kom. and Alis., Oprod. rast. Dal'nevost. kr. II (1932) 793; Nekrasova in Sov. bot. No. 6 (1933) 94, p. p. — Ic.: Kitagawa, l. c. f. 3.

Perennial, resembling *A. cordata* Thun. in habit. Stem to 1 m high; leaves to 40–50 cm long, twice, sometimes thrice pinnately compound, with 3, rarely 5, lobes of first order, 3–7(9) leaflets, these ovate, often broad, rarely oblong, mucronate, with deeply cordate, rounded or truncate, rarely oblique base, usually glabrous above, with yellowish hairs beneath confined to nerves, 2.5–20 cm long, 1.8–10 cm wide, acutely dentate, sometimes bidentate; petioles and rachis subglabrous, petiolules (2) 4–15 mm long, usually densely pubescent. Inflorescence 20–35 cm long, with small accessory paniculate inflorescences in axils of upper leaves; main inflorescence more branched and dense than in *A. cordata*, the second order axes shorter, 2.5–6(8) cm, 4–8(11) crowded in terminal umbel, the others alternate, or often approximate in 2–3; axes of second order with terminal umbel, and 3–8 lateral umbels on short, 1.5–2.5(3) cm peduncles, 33 third order axes sometimes with 1–2 fourth order axes 0.6–1 cm long, with small few-flowered umbels 0.8–1.2 cm across; umbels on axes of second and third orders 1.5–2(2,3) cm across (usually 15–20 cm [?]); nearly all flowers bisexual; inflorescences usually less hairy than in *A. cordata*; calyx of 5(6) broad obtuse teeth; petals greenish- or yellowish-white, lanceolate-triangular; styles connate for $\frac{1}{3}$ to $\frac{1}{2}$; fruit 4–5 mm across, black-blue, a 5(6) partite drupe. Fl. August, Fr. from middle of September.

Forest edges and clearings in forests and among shrubby thickets on mountain slopes. — Far East: Uss., in southernmost part, close to the sea. Gen. distr.: Jap.-Ch. (Korea and Manchuria). Described from the southeastern part of Manchuria, from the Yalu River valley near Sassuta kou (Shih Erh ta kou). Type in Tokyo? Cotype in Leningrad.

Economic importance. As in preceding species.

Note. The separation of the Far Eastern, herbaceous *A. continentalis* from the Japanese *A. cordata* Thunb. first proposed in the Russian literature is supported by the many differences in the inflorescence and flowers of these species.

5. *A. schmidtii* Pojark. in Addenda XV, 422. — *A. racemosa* var. *sachalinensis* Rgl. in Ind. sem. Hort. Petrop. (1864) 22; Gartenflora, XIII (1864) 100; Fr. Schmidt in Mém. Acad. Sc. Pétersb. VII sér. XII, 2 (1868) 141 (excl. syn.) p.p. — *A. cordata* Miyabe et Miyake, Fl. Saghal. (1915); Nekrasova in Sov. bot. No. 6 (1936) 94, p.p. non Thunb. — *A. sachalinensis* hort. ex Sieb. et Voss in Vilmorin's Blumengärten, 3 Aufl. I (1896) 403, nom. nud. pro synonym. — Ic.: Gartenflora, XIII, tab. 432.

Perennial high herbaceous plant; root fleshy, thick; stems many, erect, simple, to 1 m high; leaves to 60 cm long, long-petioled, twice or thrice pinnately compound, first order lobes opposite, of 3–7(9) leaflets, the lower often twice pinnate; stems, petioles, rachis and petiolules covered with dense yellowish hairs; leaflets on petiolules 0.3–1.5 cm long, from oblong-oval to broadly ovate, leaflets 4–20 cm long, 1.7–10 cm wide, gradually tapering to mucro, with cordate, rounded or nearly truncate base, with acute mostly simple teeth mixed with few cleft teeth, glabrous above or with scattered bristles, along veins beneath densely covered with yellow hairs. Stems produce large 17–37(40) cm long terminal inflorescence, and few small accessory inflorescences sessile in axils of upper leaves; main inflorescence a small branching panicle, the main axis bearing short divergent 3–6.5 cm second order axes, bearing umbels of bisexual flowers, 34 and often with 1–2(3) short, 0.8–1.5 cm long third order axes bearing staminate umbel, sometimes some or nearly all second order axes with only one terminal umbel; in the typical form (var. *typica* Pojark.) the second order axes crowded on main axis, some alternate, some approached, in half whorls or whorls of 2.3–5, often tipped by terminal 4–8-rayed umbel; in var. *verticillata* Pojark. all axes grouped in a few 8–15-rayed whorls; the terminal whorl umbel-like, the remaining 2–5 whorls 5–10 cm apart; umbels of bisexual flowers globular, 2–3.5(4) cm, the staminate umbels 0.8–1.5(1.7) cm across, the pedicels thin, 10–20(22) mm in the former, 0.4–0.8 mm in the latter, all axial parts densely covered with crisp yellow hairs; flowers 5–6-merous, calyx of short strict triangular teeth, petals lanceolate-triangular, acuminate, recurved below; styles connate at base or to middle; fruit globular, a 5–6 partite drupe. Fl. August–September. (Plate I, Figure 3.)

Solitary at forest edges and on herbaceous slopes. Far East: Sakh. (southern and central parts). Gen. distr.: Jap.-Ch. (Hokkaido Island). Described from Due, west coast of Sakhalin. Type in Leningrad.

Note. Differs from the other two Russian species of herbaceous *Aralia* by the large umbels of flowers and the shape of the common inflorescence with short, slightly branching second order axes.

Genus 938. **PANAX** * L.

L. Sp. pl. ed. 1 (1753) 1058

Flowers bisexual or staminate in simple umbel, calyx of 5 short teeth; petals 5, imbricate in bud, stamens 5, with thin filiform, ovoid anthers; pistils with 2 styles, free in bisexual flowers, adnate to corolla in staminate flowers; ovary 2-3-locular, with 1 ovule per locule; fruit berry-like, 2-3-locular, the pericarp thin, fleshy outside, cartilaginous inside; seeds 1 per locule, flat, disciform. Perennial herbaceous plants, with thickened, cylindrical or fusiform root (globular in one species); stem simple; leaves 2-5, palmately compound, in whorls.

Six species, 4 in E. Asia, 2 in the moderate zones of North America.

1. *P. schin-seng*, Nees v. Esenb. Icon. plant. medic. Suppl. I (1833) 70, s. str.; Poyarkova in Bot. mat. Gerb. Bot. inst. AN SSSR, XII (1950) 197. — 35 *P. quinquefolium* a. *coraeensis* Sieb. in Verh. Genoot. Batav. XII (1830) 45. — *P. schin-seng* var. 1. *coraiensis* Nees, l.c. — *P. ginseng* C.A. Mey. in Repert. Pharm. u. pr. Chem. (1842) 524; idem. in Bull. phys.-math. Acad. Sc. Pétersb. II sér. I (1843) 340; Harms in E.-P. Pflanzenfam. III, 8 (1898) 59; Kom., Fl. Man'chzh. III, 126; Kom. and Alis., Opređ. rast. Dal'nevost. kr. II (1932) 793; Nekrasova in Sov. bot. No. 6 (1933) 96. — *P. quinquefolium* var. *ginseng* Rgl. et Maxim. in Mém. Acad. Sc. Petersb. VII sér. IV, 4 (1861) 72. — *Aralia quinquefolia* Forb. et Henzl. in Journ. Linn. Soc. XXIII (1866-1868) 338, p. p. non Dcne. et Planch. — Ic.: Nees v. Esenb. l.c. tab. 70, A, 1-2, d. e. f.; Rgl. in Gartenfl. (1862) tab. 375; Harms l.c. f. 11; Kom. and Alis., ibid., tabl. 241.

Perennial; root fleshy, aromatic, cylindrical-oblong, often with 2-6 terminal branches to 2-2.5 cm thick when old, giving it an odd appearance; stems thin, green, with few fleshy scales at base, 30-70 cm high, the terminal whorl of 2-5 leaves overgrown by flower-bearing stem; leaves long-petiolate, palmately 5-compound; petiolules up to 1 cm, the leaflets oboval, mucronate, with cuneate base, finely serrate, with solitary bristly hairs above, otherwise glabrous on both sides or only along nerves; lower leaflets 2-3 cm long, 1-1.5 cm wide, much smaller than the upper, 4-15 cm long, 2.2-4 cm wide. Flower-bearing stem thin, simple, ca. 7 cm, with 1 terminal umbel or 1-3 branches bearing smaller umbels in lower part; umbels 5-16(40)-flowered; corolla pink, rarely white; fruit bright red, flattened above, 2-locular, with 1 white seed per locule. Fl. July, Fr. September. (Plate II, Figure 4.)

In dense mountain mixed and cedar forests, mostly on shady northern slopes, in thickets of ferns and shrubs, on southern slopes only in deep ravines, shielded from the sun. Requires sufficiently moist, but soaked humous soil. Very rare. — Far East: Uss. Gen. distr.: Jap.-Ch. (N. Korea, Manchuria). Described from Korea. Type unknown.

Economic importance. As early as 2800 B.C. and ever since the roots of *schin-seng* enjoyed immense popularity in Chinese medicine, and even today this is the most important plant in Chinese and Tibetan medicine. Decoctions, tinctures, pills, powders and ointments prepared from the roots are universally applied, and have an incredibly high market value. Intensified collection, forest fires and felling have made it a very rare

* From the Greek *pan* — all, and *acos* — healing, i.e. all healing.

36 plant. In Manchuria and Korea it has been cultivated for many years. Recently, cultivation has begun in N. America, for export to China. There are plantations and experimental plots in the Maritime Territory. However, the roots of plants grown from seeds are much less valuable than those of wild plants. The root crop of wild plants grown in plantations is rated somewhat higher.

Schin-seng is listed in the American pharmacopeia but not in the European one. Reports on its medical properties are highly conflicting, and in any case we still have no data to confirm the high curative effect attributed to its roots by the Chinese. It is true that it has a remarkable power to stimulate mind and body and to increase efficiency and resistance as claimed by Chinese doctors, and is applied in the treatment of fatigue and neurasthenia. It is considered to act on the organism as a whole, increasing its resistance to incipient diseases, and is therefore often used in combination with other remedies, with specific effects. Not enough is known about the chemical composition of the root and its active principle, and even less about its pharmacological properties. Recent chemical research has shown that the root contains two glucosides, panax-saponin [Russian name] with a hemolytic effect, and panakvilon [Russian name], devoid of such effect; a volatile oil sesquiterpine – panatsen [Russian name]; panax-acid, representing a mixture of stearic, palmitic and linoleic acids; phytosterol; mucous and resinous substances not yet investigated; cane sugar; iron, manganese, aluminium, phosphorus, silicon; amylase and phenolase; sulfur, and vitamins B₂ and B₁ (Vyaz'menskii in Farmakop i. toksikol. X, 3 (1947)).

Family CXIX. **UMBELLIFERAE*** Moris.

Flowers bisexual, rarely unisexual or monoecious, very rarely dioecious, in compound umbels, rarely in simple umbel or inflorescence capitate.

- 37 Very rarely inflorescence mixed with peripheral staminate or sterile flowers and central pistillate or bisexual fertile flowers; involucre at base of umbel, of few or many entire or incised, rarely pinnatisect leaflets; the more reduced involucels subtend base of umbels of the second order, with leaflets usually entire, rarely pinnatisect, sometimes united to middle and beyond to form peridium, but often obsolete or of 1–3 caducous leaflets; rarely involucre and involucrel absent. Capitate inflorescences bear, in addition to the general involucre, bracts subtending individual flowers; flowers regular, rarely irregular because of enlarged outer petals of the peripheral flowers of the umbel; calyx reduced, usually of 5, sometimes of 4 or 3 or 2 teeth, sometimes enlarged and stiffened in fruit, often teeth of calyx represented merely by narrow border, rarely calyx teeth foliate. Petals 5, free, caducous, rarely persistent, white, pink, greenish, yellow, rarely blue, sometimes entire, often notched, bilobate, the terminal lobe curved inward, sometimes adnate to median petal. Stamens 5, alternating with petals, the filaments at first curved inward. Ovary inferior, bilocular. Carpels fused in lower part of ovary to the ventral suture, separating in fruit as gynostemium (carpophore); upper part of carpels forming a flat,

* Treatment by B.K. Shishkin, unless stated otherwise in the footnotes.

pulvinate, conical, cup-shaped, rarely annular nectary usually called "stylopodium" or "glandular disk." Sometimes stylopodium stalked; summit of stylopodium and the two styles represent apocarpous part of carpels. Stigma capitate or obtuse, rarely acuminate. Four ovules borne close to base of stylopodium, 2 abortive, 1 pendulous, with single integument in each cell. Fruits generally dry, separating into two mericarps, pendulous at maturity on furcately branched gynostemium. Sometimes gynostemium not splitting, rarely obsolete, with mericarps adherent because of different anatomical characteristics. Rarely fruit monomerous through abortive development of one of the mericarps. Mericarps usually flat, ventrally, sometimes concave; dorsally more or less convex, with 5 main primary ribs, two "marginal" ribs at lateral margins of mericarp and 3 "dorsal"

38 ribs. The grooves between the ribs are known as "valleculae"; these sometimes bear secondary ribs and then primary ones weakly expressed, rarely all such 9 ribs equally developed. Secretory canals which often contain essential oils run along the mericarps, 1 to 4 such canals corresponding to the valleculae, rarely to under the primary ribs, and 2-10 canals at the side of the commissure; sometimes canals numerous, encircling the seeds ("annular"). Usually secretory conceptacles and oil tubes are continuous or articulated (septate), only rarely vesicular. In addition, a large variety of anatomical elements are related to ecological factors: air-bearing parenchyma, special air-containing spaces (aerophores), fibers running in different directions and conducting bundles; calcium oxalate is also frequent. Surface and shape of the fruit vary markedly, depending on adaptation to this or the other mode of distribution. The primary and secondary ribs may be transformed into dilated entire or dissected pteroid formations, assisting transport by wind, or into hamate clinging prickles and bristles. The mericarps may also have small round inflated cartilaginous and transverse folds or processes. Similar structures aid the distribution of the fruits [sic]. In rare cases dispersal is by the entire plant detaching as in tumbleweed. The cavity of the mericarp is filled by the seed, the shape of which agrees with that of the mericarp; they are concrescent with the mericarp, but sometimes lie free. For practical taxonomic purposes it is convenient to refer the shape of the albumen in relation to the side of the commissure, which is easily determined in cross sections of the seed. Three types are usually distinguished: 1) orthospermous - albumen flat on the commissure or barely convex or imperceptibly concave; 2) campylospermous - albumen with one, often deep, longitudinal vallecula on the side of the commissure, sometimes with margins curved inward, in cross section falcate or horseshoe-shaped; 3) coelospermous - albumen at ventral face concave, curved in the transverse as well as in the longitudinal section.

The umbelliferae are for the most part herbaceous plants, growing mostly in the temperate zone; they are very rarely woody (subtropics and tropics). The main root is often vertical, fleshy and thickened; sometimes the base of the stem is cone-shaped-inflated or underground there is found a branching or obliquely ascending rhizome; rarely the root in bundles, usually cylindrical or clavately thickened; stem commonly cylindrical, more or less furrowed, rarely smooth, with soft pith or hollow internodes, sometimes becoming hollow when mature by decay of pith. Leaves usually

- 39 alternate, with rounded, proximally rarely flat petioles, dilated into sheaths, these usually open or closed, sacciformly inflated. Very rarely the petioles bear sheathing stipules. Leaf blade usually markedly dissected, the upper leaves more simply so, sessile on sheath; rarely blade rounded-entire or entire blade with parallel venation.

Umbelliferae have in all their parts (roots, stems, leaves as well as fruits) canals which yield volatile oil or resinous substances. Many are used in the perfume industry, or for food, also in the making of confectionery. Some are cultivated for their aromatic oils (dill, parsley, cumin, fennel, coriander, and others). Carrots are cultivated because of their nutritious thickened roots. Some species contain poisonous substances dangerous for both animal and man (cowbane, poison hemlock, etc.). For details of economic importance see the specific descriptions.

Note. Genera whose presence in the USSR has not been confirmed by recent investigation are not treated. These are:

1. *Chaetosciadium* Boiss., apparently erroneously reported for the Crimea (*C. trichospermum* Boiss.). Syria and Palestine are the nearest localities.

2. *Artedia* L., reported by Boissier from specimens purported to have been collected by Nordmann in Russian Armenia (*A. squamata* L.). This record is certainly false.

3. *Lophosciadium* DC., obviously erroneously reported for E. and S. Transcaucasia (*L. meoides* (L.) Calest.), the species mentioned is endemic to Italy and the Balkans.

4. *Ridolfia* Moris., first reported for the Caucasus by Sommier and Levier in 1900 (Tr. B.C. XVI, 177). The specimen concerned from Orbeli turned out to be *Anethum graveolens* L. No other specimens which could belong here were found in the huge Caucasian herbarium of the Botanical Institute.

5. *Yabea* K.-Pol., established by Kozo-Polyanskii in Fl. Az. Ross. (vyp. 15 (1920) 61) on the basis of the American *Caucalis microcarpa* Hook. et Arn. (*Yabea microcarpa* (Hook. et Arn.) K.-Pol.) and reported for the Far East, is excluded because its occurrence in the Far East has not been confirmed.

- 40 As elsewhere fossils Umbelliferae in the USSR have been established only by finds of fruits. Thus far these have been confined to Quaternary deposits in W. Siberia and the Volga area. — *Oenanthe* is one of the few genera discovered — *Oenanthe aquatica* (L.) Poir., in postglacial deposits of the Volga Don (Duvanka), in Mindel-Riss deposits of the Ob region (Semeikin Yar) and in the 3rd terrace above the floodplain of the Lower Don (Mariinsk station). — *Sium lancifolium* M.B. var. *sisarum* in Riss-Würmian (KOSA), in deposits of the Lower Volga (Uzen River, achenes). — *S. latifolium* L. in Mindel-Riss deposits of the Ob region (Semeikin Yar), and in Riss-Würm deposits of the Ob region (Semeikin Yar).

Key to Genera

1. Inner layer of fruit wall woody; carpophore adnate to mericarps; canals under valleculae absent or submerged in main ribs; umbels

- simple or flowers in whorls; leaves rounded-peltate, with free stipules; stems creeping 2.
- + Inner layer of fruit wall soft, parenchymatous; carpophore commonly free, rarely connate; leaves never peltate, without free stipules; stems not creeping 3.
2. Mericarps 7-9-ribbed, marginal ribs slightly removed from surface of commissure 940. *Centella* L.
- + Mericarps 5-ribbed, marginal ribs overlapping, encircling the commissure 939. *Hydrocotyle* L.
3. Stylopodium annular; exocarp covered outside with scales; canals in primary ribs or lacking 4.
- + Stylopodium conical with terminal styles; canals in young fruits under valliculae, later variously disposed 7.
4. Fruit globose; mericarps obscurely ribbed, covered with hamate spines, canals numerous, surrounding seeds 941. *Sanicula* L.
- + Fruit oblong or ovoid, usually laterally compressed, covered with scarious or vesicular scales 5.
5. Mericarps densely covered with scarious scales; canals absent or very faint; flowers sessile, forming with bracts compact head; calyx-teeth and leaflets of involucre aculeate-acuminate, spinous 944. *Eryngium* L.
- + Primary ribs with antrorse vesicular scales, 5 very distinct, each with 1 large canal; flowers on more or less long pedicels 6.
6. Umbels terminal, on long peduncles; pedicels longer than large colored leaflets of involucre; perennials 942. *Astrantia* L.
- 41 + Umbels sessile in axils of stem branches; fertile flowers on very short stalks; leaflets of involucre much longer than flowers; annuals 943. *Actinolema* Fenzl.
7. Stylopodium on distinct stalk; flowers in heads; calyx-teeth large, irregular in length, persistent, spiny; primary ribs thickened distally; canals absent or confined to base of mericarps; carpophore fused; acaulescent plant with entire leaves 987. *Hohenackeria* Fisch. et Mey.
- + Stylopodium always sessile; flowers in compound umbels, rarely in heads; calyx-teeth usually soft, often deciduous or absent; ribs equal for entire length, not thickening distally; canals nearly always distinct; carpophore mostly very distinct; leaves as a rule variously dissected, very rarely entire but then stem very distinct and calyx-teeth inconspicuous 8.
8. Secondary ribs absent above canals of valliculae or bearing 2-3 rows of large coriaceous spines, never with winglike extension; fruit usually laterally compressed; fruit wall with druse crystals; albumen often furrowed 9.
- + Secondary ribs over vallicular canals forming wings or protruding striae, similar to main (primary) ribs and of nearly the same size; sometimes secondary ribs with similar row of spines; fruit dorsally compressed, fruit wall without druse crystals, albumen nearly flat 139.
9. Central flowers of umbel sessile, bisexual, surrounded by a crown of pedicellate staminate flowers, the concrescent bases of their pedicels forming a kind of involucre 945. *Echinophora* L.

- + Main umbels with bisexual or unisexual flowers, sometimes polygamous. Plants sometimes dioecious; bisexual flowers never subtended by fused involucre 10.
10. Albumen of seed with deep ventral furrow or stria, in cross section crescent-shaped to bicornute to horseshoe-shaped or else forming an open ring 11.
- + Albumen of seed flat or with slight broad notch, in cross section rounded, pentagonal, subrounded or flat (nearly linear), seed suture sometimes protruding only opposite carpophore 50.
- 42 11. Fruit long-cylindrical or short with parenchyma surrounding carpophore, with druses or other crystals, if short then with spines or bristles 12.
- + Fruit wall of parenchyma surrounding carpophore, without druse crystals, fruit globular or ovoid, rarely oblong, always smooth or faintly tuberculate 29.
12. Fruit oblong-cylindrical, rarely ovoid, sometimes with beak, smooth or with short spines, not with distinct rows of prickles 13.
- + Fruit ovoid to globular, with rows of spines or bristles above valleculeae, rarely with scabrous verrucae; calyx of 5 distinct, often foliate teeth 23.
13. Ribs of fruit obtusely convex, filiform, or nearly obsolete 14.
- + Ribs of fruit broadly trihedral or subpterygoid 20.
14. Petals deeply notched to at least $\frac{1}{3}$, obcordate, often with overlapping lobes; fruit without beak, the ribs thickened, obtuse, light-colored, often slightly protruding, at least twice as wide as dark-colored, narrowly canaliculate valleculeae, canals under valleculeae well-developed 15.
- + Petals rounded or with slight broad notch, with short, wide, slightly curved lobe (with the exception of the enlarged marginal flowers of some species of *Scandix* where obcordate petals are notched on the recurved apex); fruits with long or short, sometimes inconspicuous beak; canals thin, often obliterated when fruit ripens 22.
15. Styles very short, shorter than stylopodium; fruit with broad base, pyramidal, its ribs wide and low, with broad sclerenchymatous wings, valleculeae very narrow, filiform; fruit nearly without external furrows, covered with small bristles sessile on antrorse tubercles; albumen horseshoe-shaped to concave, with prominent recurved margins, with narrow commissural furrow, widening inward; annuals 946. *Physocaulis* (DC.) Tausch.
- + Styles as long as stylopodium; ribs of fruit narrow; biennials or perennials; fruit without bristles 16.
16. Calyx-teeth conspicuous, sometimes elongating and hardening in fruit 17.
- + Calyx-teeth inconspicuous 19.
- 43 17. Calyx-teeth not hardening 949. *Sphallerocarpus* Bess.
- + Calyx-teeth hardening 18.
18. Fruit with winged marginal ribs 951. *Caropodium* Stapf et Wettst.
- + Fruit without wings 950. *Crammosciadium* DC.
19. Fruit pyriform 948. *Krasnovia* M. Pop.
- + Fruit cylindrical 947. *Chaerophyllum* L.

20. Fruit oblong-ovate, scarious, with filiform ribs each bearing 1-2 rows of bristles 956. *Albertia* Rgl. et Schm.
 + Fruit linear-oblong, with antrorse, sometimes subappressed, bristles 21.
21. Bristles subappressed; umbels 3-8-rayed, with naked rays 954. *Osmorhiza* Rafin.
 + Bristles antrorse, sessile on tubercles; umbels with 8-10 scabrous-hairy rays 955. *Myrrhis* Mill.
22. Fruit with short beak, not exceeding half the length of the fertile part, furrowed, without bristles, not curved when ripe; mericarps regularly convex in cross section, without protruding ribs; fascicles in primary ribs filiform, remote, arranged in circle; canals obliterated when ripe 952. *Anthriscus* (Pers.) Hoffm.
 + Beak slightly longer than or a few times as long as fertile part of fruit, ribbed, nearly always with antrorse bristles, curved when ripe; fruit with discernible ribs forming margin of fruit, or close to it 953. *Scandix* L.
23. Fruit dorsally compressed, with broad commissure; albumen flat-calyciform, in cross section faintly notched along middle, the margins parallel to the commissure 963. *Orlaya* Hoffm.
 + Fruit more or less tapering with commissure narrower than the small diameter of the fruit; in cross section albumen deeply notched, falcate, the margins perpendicular to commissure or inrolled 24.
24. Albumen deeply notched with flat margins appressed to commissure 25.
 + Albumen rolled, the margins adjacent to middle of commissure ... 27.
- 44 25. Fruit with distinct protruding ribs, with secondary ribs above valleculae bearing 2-3 rows of long spines 959. *Astrodaucus* Drude.
 + Ribs faintly protruding, bristly, the interstitial space densely filled with scabrous spines 26.
26. Spines strong, scabrous, curved or hamate above 957. *Torilis* Adans.
 + Fruit irregularly covered with long bristly hairs 958. *Psammogeton* Edg.
27. The three main protruding dorsal ribs dentate, the valleculae smooth or covered with verrucae 962. *Lisaea* Boiss.
 + Midribs covered with bristles, valleculae with 1 or 2-3 rows of spines 28.
28. Main ribs faintly protruding, bearing bristles; secondary ribs more pronounced, with single row of spines 960. *Caucalis* L.
 + Main and secondary ribs protruding, bearing 1-3 rows of spines ... 961. *Turgenia* Hoffm.
29. Fruit nut-shaped, with ligneous layer subtending the smooth epidermis 30.
 + The 2 mericarps tapering in plane of commissure, cylindrical convex laterally, with filiform or protruding nerves 35.
30. Fruit nearly not tapering in plane of commissure, commissure without 2 apertures 31.

- + Fruit markedly tapering in plane of commissure, geminate, commissure with 2 apertures 34.
31. Fruit oblong-pyriform, with brittle pericarp 967. *Fuernrohria* C. Koch.
- + Fruit short-prismatic or subcylindrical 32.
32. Ribs on fruit undulant; annuals, very rarely perennials 964. *Coriandrum* L.
- + Ribs on fruit straight; perennials, rarely annuals 33.
33. Styles recurved, calyx-teeth hardening in fruit 965. *Stchtschurowskia* Rgl. et Schmalh.
- + Styles erect, calyx-teeth not hardening... 966. *Kosopoljanskia* Korov.
34. Calyx 5-toothed, stylopodium flat-pulvinate; perennials 968. *Schrenkia* Fisch. et Mey.
- + Calyx without teeth, stylopodium short-conical; annuals 969. *Biforia* Hoffm.
35. Pericarps spongy or brittle, thickened, often several times as wide as the seed; ribs smooth, thickened-spongy, often confluent or tuberculate-scabrous or with vesicular formations; albumen thin, strongly inrolled 36.
- 45 + Pericarps not thickened, spongy or brittle 40.
36. Petals white; fruit oblong-acuminate, somewhat elongated to form beak, with scabrous-tuberculate surface; canals around seeds numerous 982. *Lecokia* DC.
- + Petals yellow; fruit not pubescent, cylindrical-elliptic or sub-globular, obtuse above 37.
37. Ribs on brittle pericarp narrowly winged or with rows of teeth 983. *Hippomarathrum* Hoffm. et Link.
- + Fruit quite smooth, ribs not winged 38.
38. Stylopodium sunk between 2 mericarps ... 985. *Cryptodiscus* Schrenk.
- + Stylopodium at apex of fruit 39.
39. Fruit cylindrical; cork-like spongy ribs confluent 984. *Cachrys* L.
- + Fruit with 5 cork-like, thick, protruding trihedral ribs 986. *Prangos* Lindl.
40. Ribs of fruit undulant, mericarp not tapering in plane of commissure, carpophore entire, 2-3 canals under valliculae 975. *Conium* L.
- + Ribs of fruit often broadly winged if filiform, then not undulant, mericarps sometimes subglobular, strongly tapering in plane of commissure, carpophore split 41.
41. Fruit geminate, carpophore reduced, fruit wider than long 42.
- + Fruit oblong-ovoid, with protruding, thickened or winglike-dilated ribs 46.
42. Mericarps with 4 dorsal canals and 2 canals at commissure; petals obtuse, with large inrolled lobe 974. *Danaa* All.
- + Mericarps with numerous canals; root often tuberiform 43.
43. Albumen excavate; petals obcordate or elliptic, with rather long inrolled lobe 44.
- + Albumen horseshoe-shaped at cross section; petals slightly notched, with short inrolled lobe 45.

44. Stylopodium reduced; fruit obtuse 970. *Astomatopsis* Korov.
+ Stylopodium conical, fruit acuminate 971. *Scaligeria* DC.
46 45. Ribs very slightly protruding, lateral ribs inconspicuous, all ribs
arcuately curved 972. *Smyrnum* L.
+ Ribs markedly protruding, lateral ribs well developed
. 973. *Smyrniopsis* Boiss.
46. Pericarp with very loose middle layer, thus epidermis and inner
layer forming ribs and canals adjacent to seeds peel off readily;
calyx 5-toothed 976. *Pleurospermum* Hoffm.
+ Pericarp firm, seeds not lying free; calyx-teeth inconspicuous . . . 47.
47. Ribs acute, not winged 48.
+ Ribs winged 49.
48. Valleculae with 3 canals; fruit smooth.
. 978. *Eleutherospermum* C. Koch.
+ Valleculae with 1 canal; fruit covered with verrucae
. 980. *Trachydium* Lindl.
49. Leaflets of involucl large, exceeding umbel; fruit glabrous
. 977. *Hymenolaena* DC.
+ Leaflets of involucl shorter than umbel; fruit often verrucose
. 979. *Aulacospermum* Ldb.
50(10). Lateral ribs similar to dorsal (only in *Selinum* nearly twice
as long, broadly gaping); seeds subcylindrical, with well developed
albumen 51.
+ Lateral ribs much wider (in *Conioselinum* and *Levisticum*
only twice as wide), than the often only slightly prominent 3 dorsal
ribs, forming marginal wings on mericarps; seeds narrow 100.
51. Ribs slightly protruding; mericarps with narrow commissure . . . 52.
+ Ribs markedly protruding, sometimes winglike, marginal ribs
increase the width of the mericarps 86.
52. Leaves all entire 988. *Bupleurum* L.
+ Leaves (at least the lower) variously dissected or dentate 53.
53. Canals under main ribs large, sometimes in addition to very narrow
canals under valleculae; flowers dioecious; petals white, entire,
with inrolled apex; leaves thinly dissected 54.
+ Canals under valleculae well developed, sometimes ribs with very
narrow canals adjacent to fibrous bundles; at ripening canals
sometimes obliterated; flowers bisexual or polygamous 56.
47 54. Ribs filiform, straight, glabrous or pubescent 989. *Trinia* Hoffm.
+ Fruit ribbed, transversely rugose or plicate, always glabrous 55.
55. Fruit subglobular; biennials with narrowly linear, long (1-3 cm)
leaf lobes 990. *Rumia* Hoffm.
+ Fruit ovoid; perennials with short (2-12 mm) leaf lobes
. 992. *Ledebouriella* Wolff.
56. Fruit ribbed, transversely plicate or densely covered with
verrucose processes 57.
+ Ribs filiform, straight 59.
57. Perennial tuberous plants; involucre and involucl present
. 992. *Ormopterum* Schischk.
+ Annuals with thin root 58.

58. Secondary ribs broad, spongy, with transverse folds; involucre absent 993. *Szovitsia* Fisch. et Mey.
- + Primary ribs acute, densely covered with white verrucose swellings; involucre of 5 leaflets 981. *Eremodaucus* Bge.
59. Filiform main ribs over canals, alternate with wide or rather prominent accessory ribs, without vascular bundles 60.
- + Mericarps with only 5 equal, filiform main ribs 62.
60. Fruit elongate-cylindrical, secondary ribs with stellate bristly hairs; calyx-teeth subulate, irregular 996. *Cuminum* L.
- + Fruit cylindrical; calyx-teeth inconspicuous 61.
61. Mericarps covered with capitate hairs, vallecular canals solitary, 2 at commissure; styles twice as long as stylopodium; annuals ...
- 994. *Aphanopleura* Boiss.
- + Mericarps glabrous, canals absent; styles shorter than stylopodium
- 995. *Froriepia* C. Koch.
62. Plant with strong, subglobular tuber; fruit long-ovoid to linear; vallecular canals usually 2 to 3 or many, usually narrow, rarely solitary; petals white or reddish or greenish-white or yellow 63.
- + Plant without tubers; fruit ovoid or ovoid-cylindrical 67.
63. Petals yellow 64.
- + Petals white 65.
64. Calyx-teeth short, petals greenish-yellow; vallecular canals resinous, solitary, 2 canals at commissure 1012. *Korshinskya* Lipsky.
- 48 + Calyx-teeth inconspicuous, petals yellow; vallecular canals resinous 2-3, 4-6 canals at commissure 1011. *Muretia* Boiss.
65. Tuber hidden deeply in soil; perennial, radical leaves 1, rarely 2-3
- 1007. *Bunium* L.
- + Tuber close to surface; annual or biennial; radical leaves few or many 66.
66. Vallecular canals solitary, 2 canals at commissure, ribs dilated winglike, involucre absent, terminal lobes of leaves lanceolate
- 1010. *Seselopsis* Schischk.
- + Vallecular canals 1-4, 2-10 canals at commissure, ribs filiform; involucre always present; terminal lobes of leaves filiform or capilliform 1009. *Hymenolyma* Korov.
67. Fruit cordate-cylindrical, often geminate or only slightly elongate; vallecular canals 2-3 or many or absent 68.
- + Fruit oblong-oval or ovoid-cylindrical, vallecular canals nearly always single 75.
68. Plant subcaulescent, the leaves of the radical rosette subtending simple long-peduncled umbels mixed with compound umbels
- 1013. *Chamaesciadum* C. A. M.
- + Stems well developed; umbels always compound 69.
69. Flowers yellow 1016. *Reutera* Boiss.
- + Flowers white or pink 70.
70. Calyx-teeth large, persistent 71.
- + Calyx-teeth inconspicuous 72.
71. Umbels on short stalks, opposite leaves; albumen surrounded by compact ring of canals 1020. *Berula* C. Koch.
- + Umbels on more or less long stalks, not opposite leaves; vallecular canals in groups of 3 1019. *Sium* L.

72. Canals obliterated in ripe fruit; styles short; leaves commonly ternate-compound, very rarely twice pinnate . . . 1018. *Aegopodium* L.
+ Vallecular canals in groups of 2-3 or many; styles long; leaves simple or many times pinnate, rarely entire or simple-ternate . . . 73.
73. Leaves entire, rounded or ternate or ternate-spatulate; fruit glabrous, rugose; perennials 1017. *Albovia* Schischk.
+ Leaves commonly simple or twice pinnate, rarely radical leaves entire, and then plant annual 74.
- 49 74. Albumen broadly concave at commissure; fruit obpyriform, asymmetrical, mericarps separating with difficulty
. 1015. *Anisum* Gaertn.
+ Albumen flat at commissure; fruit ovoid or globular-ovoid, carpophore split 1014. *Pimpinella* L.
75. Fruit ovoid cylindrical or markedly inflated, cordate-germinate, often wider than high, smooth or finely verrucose or scabrous-pubescent; vallecular canals nearly always single; petals oval, acute and entire or obovate and notched 76.
+ Fruit oblong-ovoid or 2 cylindrical inward curved mericarps, narrower than high, always smooth; canals solitary (in *Carum* sometimes 2-3); petals white or pink, with claws, obcordate, with inward curved tip 81.
76. Petals yellowish-green, often with reddish stripes; mericarps with 5 prominent ribs; terminal lobes of leaves long-filiform
. 999. *Petroselinum* Hoffm.
+ Petals white 77.
77. Calyx-teeth large, foliate, persistent 1001. *Cicuta* L.
+ Calyx-teeth absent or very tiny, inconspicuous 78.
78. Fruit scabrous, at least verrucose-scabrous along ribs; petals with deeply cordate incision, plicate, with inward curved tip
. 1002. *Trachyspermum* Link.
+ Fruit smooth, ribs markedly protruding 79.
79. Petals rounded, broadly notched, with broad inward curved lobe; vallecular canals extend from apex to middle of fruit where they terminate in clavate extension 1000. *Sison* L.
+ Petals oval, acute, entire, straight or with inrolled tip; vallecular canals extend over entire fruit; umbels distinctly opposite leaves; carpophore twice laciniate 80.
80. Involucre of 1-7 leaflets, involuclers of 5-6 triangular-lanceolate, 3-nerved leaflets 998. *Helosciadium* Koch.
+ Involucre and involucler wanting 997. *Apium* L.
- 50 81. Umbels without involucre, together forming paniculate corymb; mericarps with solitary vascular bundles under 5 primary ribs and 2 broad ribs at commissure; leaves palmately 3-5-fid, with delicate, broad ovate-lanceolate, dentate lobes 1103. *Cryptotaenia* DC.
+ Flowers in regular compound umbels with or without involucre; mericarps with only 5 vascular-fibrous bundles; leaves never simple, 3-5-fid 82.
82. Petals deeply bipartite, obliquely obovate, 1 petal bigger than the rest, with median apical lobe sessile at depth of incision; leaflets of involucre 3-fid or pinnate 1004. *Ammi* L.

- + Petals faintly obcordate-notched or slightly 2-lobed, lobes equal; petals at base of incision with transverse fold, from which emerges the incurved tip, involucre absent or of 1-2 caducous leaflets 83.
83. Involucre and involucrel pinnatifid 1028. *Schultzia* Spreng.
- + If present, involucre and involucrels entire or 3-lobed 84.
84. Fruit narrowly oblong; primary ribs with large, tangentially attenuate or flat bundles of sclerenchyma; calyx-teeth conspicuous; leaves thrice pinnate, lobes of the last order serrate or dentate 1005. *Falcaria* Berth.
- + Fruit oblong-ovoid; primary ribs filiform, with thin, stereomatic bundles cylindrical or triangular in cross section; calyx-teeth inconspicuous or absent; lobes of the last order entire 85.
85. Stylopodium large, cylindrical-conical, with undulant base; marginal ribs slightly dilated 1008. *Zeravschania* Korov.
- + Stylopodium short-conical; marginal ribs not dilated 1006. *Carum* L.
- 86.(51). Petals yellow or greenish-yellow or greenish; fruit ovoid-cylindrical, cylindrical in cross section or dorsally compressed 87.
- + Petals white, reddish, straw-colored or greenish-white 88.
87. Petals greenish-yellow or greenish, oblong-elliptic or obovate, with thickened midrib protruding on both sides; involucrel absent 1030. *Silaus* Bernh.
- 51 + Petals bright yellow, broadly ovate, with broad, nearly flat, broadly obtuse inward curved tip; involucrels and involucre absent; leaves thinly dissected, lobes of the last order capilliform-filiform or subulate; marginal ribs slightly more developed than the 3 dorsal ribs; fruit cylindrical in cross section; plant pale green, at least above (especially young inflorescences and fruit), with more or less conspicuous bluish stripes; leaf sheaths usually 3-6 cm long, the upper possibly much shorter, with reduced nearly obsolete blades; petals 0.75-1 mm long, to 1-1.25 mm wide; flowers 2 mm across 1029. *Foeniculum* Mill.
88. Fruit shortly ovoid-cylindrical or obclavate, with broad obtuse stylopodium (in *Oenanthe*, this is always glabrous); ribs wingless, thick-filiform or broadly triangular, or lateral ribs slightly winglike, thicker than the dorsal; mericarps dorsally triangular-round in cross section or subround, not flattened; fruit smooth or pubescent 89.
- + Fruit ovoid-cylindrical, not dorsally compressed, smooth; all ribs similar, narrowly winged, the marginal slightly broader; seeds broad, often pentagonal-rounded; petals white, greenish-white or reddish-white 95.
89. Seeds encircled by numerous canals; wall of fruit inflated-thickened, much wider than seeds; these irregularly cylindrical, convex at commissure; sea-shore plant, with fleshy once-twice pinnate leaves and entire linear-lanceolate 1-nerved lobes, 1021. *Crithmum* L.
- + Canals under vallecule single (in some species of *Seseli* 2-4) 90.
90. Ribs filiform, equal or else the marginal ones slightly thickened; petals obcordate, with inturned tip; fruit glabrous or pubescent 91.

- + All ribs wide, thickened and cortically inflated, the lateral barely larger than the dorsal 93.
91. Flowers subsessile; fruit not splitting 1025. *Sphoenocarpus* Korov.
- + Flowers on more or less long pedicels, rarely subsessile, but then fruit readily splitting 92.
92. Calyx-teeth long-subulate, deciduous; involucre multifoliate; leaflets of involucre always free; fruit nearly always pubescent. 1023. *Libanotis* L.
- 52 + Calyx-teeth short and thick, persistent; involucre often absent; leaflets of involucre often fused proximally or to middle; fruit glabrous or pubescent 1024. *Seseli* L.
93. Ribs thickened, usually bearing stiff scales or pubescent; sub-acaulescent plant 1022. *Stenocoelium* Ldb.
- + Ribs on mericarps smooth, glabrous; plant with developed leafy stem 94.
94. Carpophore absent or adnate to fruit wall; fruit tapering above seeds to beak bearing 5 large lanceolate teeth from split calyx, tipped by bicornute stylopodium; ribs broad, obtuse; swamp and water plant 1026. *Oenanthe* L.
- + Carpophore developed, calyx-teeth inconspicuous; fruit ovoid-cylindrical, keeled, triangular in cross section; annual herbs, umbels without involucre, plants easily recognized by the one-sided, oblong-linear, acuminate, extrorse, recurved leaflets of involucre 1027. *Aethusa* L.
95. Vallecular canals single or 2-3, always distinct 96.
- + Vallecular canals 3 or more, sometimes very small; bundles of dorsal ribs in cross section round or ovate, never striate; marginal ribs united in pairs 99.
96. Ribs not equal, in cross section marginal, twice as large as the acutely winged dorsal ribs; marginal ribs of mericarps remote from commissure (mericarps united only by narrow stria); fruit at this time 10-winged; rib bundle striate in cross section; styles much longer than stylopodium; ribs of stem sometimes acute above, usually thinly winged 1032. *Selinum* L.
- + Ribs nearly equal, with opposite marginal ribs fused along commissure, and mericarps largely fused; entire fruit 8-ribbed; ribs of stem less acute, never winged 97.
97. Winged ribs of fruit strongly undulant distally 1033. *Hyalolaena* Bge.
- + Ribs of fruit not spreading 98.
98. Ribs of fruit hollow, the fruit wall becoming easily detached from seed; bundle of ribs striped in cross section; styles twice as long as stylopodium; branching of leaf petiole of first order directed perpendicularly or downwards; leaflets of involucre with narrow distinct whitish margin, with obtuse papillae 1036. *Cenolophium* Koc.
- 53 + Ribs filled; seed adnate to fruit wall; styles 3 times as long as stylopodium or even longer; first order branches of leaf petiole less spreading; leaflets of involucre with margin smooth, bearing acute papillae or ciliate 1031. *Cnidium* Cuss.

99. Albumen with distinct furrow, ribs obtuse, nearly filiform, slightly protruding; petals with slightly recurved barely notched tip 1035. *Pachypleurium* Ldb.
- + Albumen flat or slightly impressed; ribs thinner, more markedly protruding, more or less winged; petals usually distinctly obcordate-notched, with infolded tip; lobes of the last order flat, sometimes very narrow 1034. *Ligusticum* L.
- 100(50). Marginal wings of mericarps separated, outside margin gaping (approximate only in *Conioselinum*); fruit dorsally elliptic, rounded or slightly cordate at base 101.
- + Marginal wings of both mericarps firmly appressed 110.
101. Albumin of seed flat (orthospermous) 102.
- + Albumen of seed crescent-shaped or nearly horseshoe-shaped, incurved or plano-incised (campylospermous) 108.
102. Leaves twice-thrice pinnate, with long turbinate inflated sheaths; mericarps broadly approximate; 3 dorsal ribs winged, as long as half the width of the marginal ribs; bundle in primary ribs absent 1037. *Conioselinum* Fisch.
- + Leaves ternate-dissected and many times pinnatipartite or pinnatifid; commissure very narrow. Marginal wings gaping about middle of fruit; 3 dorsal ribs much less protruding, not winged or very slightly so (cf. *Levisticum* and *Coelopleurum*); bundles in all ribs distinct, in dorsal ribs near middle, in the marginal ones near base 103.
103. Calyx-teeth ovate, $\frac{1}{3}$ to $\frac{1}{4}$ the length of the petals 104.
- + Calyx-teeth inconspicuous 105.
104. Petals yellowish-greenish, umbel rays conspicuously unequal; leaves not curved-geniculate 1044. *Xanthogalum* Lallem.
- + Petals white, umbel rays nearly equal; leaves geniculate-curved below 1038. *Ostericum* Hoffm.
105. Resinous canals numerous, encircling seed 1040. *Archangelica* Hoffm.
- 54 + 1-3 resinous canals in valliculae 106.
106. Dorsal and marginal ribs differing very little in width 1041. *Coelopleurum* Ldb.
- + Dorsal ribs filiform or narrowly winged, the marginal ones dilated 107.
107. Petals white or greenish-whitish 1039. *Angelica* L.
- + Petals whitish-yellowish 1045. *Levisticum* Hill.
108. Seeds adnate to pericarp 1046. *Glehnia* Schmidt.
- + Seeds crescent-shaped, readily separating 109.
109. Dorsal ribs acute or obtuse 1042. *Agasyllis* Spreng.
- + Dorsal ribs narrowly winged 1043. *Chymsydia* Alb.
110. Marginal wings of both mericarps firmly appressed at least at outer margin, forming thin or thickish ring (but not inflated-flattened at outer margin); much more protruding than slightly protruding dorsal ribs, their bundles single, if 2, then only 1 very close to base of wing 111.
- + Margins of wings of mericarps indurate, thickened, firmly appressed at outer margin. Marginal wings with single proximal nerves (or nerve at base of cross section) thickening outwards;

- in central part of mericarp margins further enlarged, 3 dorsal ribs not or only very slightly protruding 132.
111. Annual plants, mericarps boat-shaped 1051. *Cymbocarpum* DC.
+ Perennials or biennials; mericarps never boat-shaped 112.
112. Carpophore obsolete; fruit not splitting, vittae not discernible; acaulescent plant 1068. *Symphyoloma* C. A. M.
+ Carpophore free, vittae often well developed, above-ground stem present 113.
113. Umbels simple, subsessile, inflorescence branched
..... 1059. *Dorema* Don.
+ Umbels compound 114.
114. Lateral bundles remote from the dorsal, albumen and endocarp adnate to mesocarp 1067. *Pastinaca* L.
55 + Bundles of all ribs equidistant; dorsal ribs filiform or obscure, albumen and endocarp adnate to pericarp 115.
115. Canals small, numerous, encircling albumen
..... 1058. *Ferulago* Koch.
+ Canals in valliculae 1-3, at commissure 2-4 (in *Ferula* often forming a ring, but then nearly obliterated and superficial) 116.
116. Flowers bisexual, all umbels equal, canals in valliculae 117.
+ Flowers polygamous, bisexual in terminal umbel, staminate in lateral, canals often encircling seeds 127.
117. Fruit convex dorsally 118.
+ Fruit nearly flat dorsally 120.
118. Petals a bright egg-yellow, more or less rounded, with obtuse square incurved lobe; fruit narrowly winged; annuals
..... 1064. *Anethum* L.
+ Petals white, margins of mericarps not winged 119.
119. Ovary glabrous; leaves bi- or triternate, with rounded large leaflets; involucre of 1-2 mm long leaflets 1061. *Laser* Borkh.
+ Ovary densely covered with transverse processes, almost obliterated at ripening; leaves bi- or tripinnate, with small narrowly ovate lobes 1050. *Saposhnikovia* Schischk.
120. All main ribs equally thickened, the marginal without wings or bark-like thickening; canals 3-4 in valliculae, 6 at commissure
..... 1047. *Palimbia* Bess.
+ Marginal ribs winged or with thick bark-like edges 121.
121. Canals in 2 series, outer - 1 canal in each of the valliculae, the inner of numerous narrow canals; root thick cylindrical, involucre and involucre present 1066. *Mogoltavia* Korov.
+ Canals single in valliculae, 2-8 at commissure 122.
122. Plant with superficial tuber, flowers always white, biennials
..... 1063. *Oedibasis* K.-Pol.
+ Perennials with more or less thickened root, flowers white or yellow 123.
123. Marginal ribs with narrow or broad wings 124.
+ Marginal ribs with thickish, bark-like margins, not winged 125.
- 56 124. Root a short cylindrical tuber 1065. *Korovinina* Nevski et Vved.
+ Root never tuberiform 1062. *Peucedanum* L.
125. Petals white, canals 2 at commissure
..... 1049. *Phojodicarpus* Turcz.

- + Petals yellow, canals 2-6 at commissure 126.
- 126. Valleculae with 3 canals; albumen flat ... 1060. *Opopanax* C.Koch.
- + Valleculae with single large canal; albumen crescent-shaped ...
..... 1048. *Johrenia* DC.
- 127. Mericarps asymmetrical 1057. *Komarovia* Korov.
- + Mericarps symmetrical 128.
- 128. In ripe fruit canals inconspicuous; lower leaves biternate
..... 1054. *Ladyginia* Lipsky.
- + Canals distinct, variously disposed 129.
- 129. Mericarps densely pubescent at commissure 130.
- + Mericarps glabrous at commissure 131.
- 130. Root with more or less developed tubers; fruit densely pubescent
..... 1056. *Schumannia* Kuntze.
- + Root not tuberous; fruit glabrous 1055. *Eriosynaphe* DC.
- 131. Umbels capitate, flowers sessile 1053. *Soranthus* Ldb.
- + Flowers typically pedicellate 1052. *Ferula* L.
- 132(110). Marginal ribs of mericarps thick, with inflated or rugose
thickenings; canals narrow, single in valleculae; annuals, rarely
biennials 133.
- + Marginal ribs smooth, thin or equally thickened 134.
- 133. Albumen flat or slightly concave 1176. *Tordylium* L.
- + Albumen deeply concave 1075. *Ormosciadium* Boiss.
- 134. Petals yellow 1071. *Malabaila* Hoffm.
- + Petals white, rarely violet-reddish 135.
- 135. Commissure and valleculae without canals; petals reddish-violet;
plant spreading on ground; stem 10-20 cm
..... 1074. *Pastinacopsis* Golosk.
- + Canals under valleculae present; petals white; stem more or
less high, erect 136.
- 136. Canals not reaching base of fruit, usually arcuate, often slightly
inflated distally 1069. *Heracleum* L.
- 57 + Canals reaching base of fruit, not inflated distally 137.
- 137. Petals hairy outside; canals very narrow, often 3 in valleculae
..... 1070. *Stenotaenia* Boiss.
- + Petals glabrous outside; canals single in valleculae 138.
- 138. Marginal petals in Russian species barely enlarged; mericarps
with sharply defined inflated-thickened margin
..... 1072. *Zosimia* Hoffm.
- + Marginal petals enlarged; mericarps without sharply defined
margin 1073. *Platytaenia* Nevsky et Vved.
- 139(8). Secondary ribs bearing spines, primary dorsal ribs with bristles
..... 1079. *Daucus* L.
- + Secondary ribs winged; fruit without spines 140.
- 140. Main ribs narrowly winged 1077. *Polylophium* Boiss.
- + Main ribs filiform 1078. *Laserpitium* L.

Subfamily I. **HYDROCOTYLOIDEAE*** Drude in E.—P. Pflanzenfam. III, 8
(1898) 116.—Fruit markedly compressed laterally, with strongly keeled

* Treatment by E.G.Bobrov.

prominent midrib; mericarps 5-9-ribbed, lateral ribs often faint; endocarp lentiform, compressed, woody, acutely keeled, surrounding small seed; calyx scars obscure; vittae and carpophore absent. Perennial herbs, with decumbent rooting stems and entire or lobed leaves; inflorescence subcapitate, usually on axillary peduncles.

Genus 939. **HYDROCOTYLE*** L.

L. Sp. pl. (1753) 234; A. Roch. Monogr. (1820) 24, p.p.

Calyx-teeth absent, margin hardly discernible; petals white, entire; fruit markedly compressed laterally; mericarps subcylindrical, with prominent sharp keel-shaped dorsal rib, lateral ribs faintly developed, marginal ribs at commissure; endocarp a hard flat cup containing flat keeled seed. Perennial, sometimes biennial herbs, with creeping stems, usually rooting at nodes; leaves with narrowly coriaceous stipules, rounded or reniform, crenate or faintly lobed; peduncles axillary or almost opposite leaves; flowers few, short-pedicel, in capitate whorls or in simple raceme, on filiform peduncles, small, bisexual; leaflets small, deciduous.

58 Over 50 species mainly in the southern hemisphere — some including the Russian *H. vulgaris* L. — and temperate zones of the northern hemisphere.

Type of genus: *H. vulgaris* L.

1. Leaves and peduncles borne on rooting nodes of stem; leaves peltate or reniform-triangular, with open basal notch 2.
- + Leafy branches with peduncles borne at rooting nodes of stem; basal notch of leaf imbricately closed 3. *H. ramiflora* Maxim.
2. Leaves rounded, peltate, simple or bicrenate to faintly lobed, petiole attached to center 1. *H. vulgaris* L.
- + Leaves reniform or triangular-cordate, with very excentric petiole, narrow cordate base, deeply lobed, with median lobe cut to middle of leaf 2. *H. ranunculoides* L.

1. *H. vulgaris* L. Sp. pl. (1753) 234; A. Rich. Monogr. 25; Ldb. Fl. Ross. II, 1, 234; Boiss. Fl. or. II, 820; Shmal'g., Fl. I, 383; Grossg., Fl. Kavk. III, 118. — Ic.: A. Rich. Monogr. f. 1; Hegi, III. Fl. V, 2, Taf. 190, 5, F. 2324-2328. — Exs.: G. R. F. No. 2618; Fl. exs. reip. Boh.-Slov. No. 436.

Perennial or biennial. Stem thin, glabrous, creeping, 10-60(100) cm, rooting, glabrous, bearing leaves and peduncles at nodes; petioles with small rounded stipules, with spreading hairs above; blade rounded, 1.5-4 cm across, glabrous above, often hairy beneath, flat, crenate or bicrenate to faintly lobed, peltately with petiole in center of leaf. Inflorescence solitary or 2-3 on thin peduncle, half the length of the adjacent petiole or shorter; flowers sessile, few, crowded; bracts per flower, ovate, coriaceous; petals ovate, flat, white, ca. 0.75 mm long, longer than stamens; fruit with

* From the Greek *hydor* — water, *kotyle* — dish, umbilicus; referring to the habitat of *H. vulgaris* L. and to the shape of its leaves.

ellipsoid flat side, ca. 2 mm long, wider than long, with reddish verrucae; styles slightly removed, becoming recurved, longer than stylopodium. July.

Moist places, marshes, sometimes in water. — European part: Balt. (forests near Riga and Liepaja, W. Estonia), U. Dnp. (after old reports for 59 Minsk); Caucasus: W. Transc. (Poti, Batumi, Kobuleti, Skurcha), S. Transc. (Echmiadzin — doubtful record), Tal. (Lenkoran). Gen. distr.: Atl. and Centr. Rue., N. Med. Described from Europe. Type in London.

2. *H. ranunculoides* L. fil. Suppl. (1781) 177; Rich. Monogr. 55; Urban in Ber. Deutsch. Bot. Gesellsch. II, 175. — *H. natans* Cir. Pl. rar. Neapol. I (1788) XX, tab. 6, B; A. Rich. Monogr. 54; Boiss. Fl. or. II, 820; Shmal'g., Fl. I, 383; Grossg., Fl. Kavk. III, 118. — Ic.: A. Rich. Mongr. f. 20; Urban in Mart. et Eichl. Fl. Brasil. XI, 1, tab. 76, III.

Perennial glabrous plant; leaf 0.8–7 cm wide, broadly reniform or triangular-cordate, rarely subrounded, usually lobed with deeply cut terminal lobe, rarely all lobes equal, shortish, base of leaves with deep and open notch. Peduncles much shorter than petioles of adjacent leaves, becoming curved; inflorescence capitate, 4–15-flowered; bracts often fused, very thinly scarious; petals 1–1.3 mm long, longer than filaments, disk flat or slightly convex, pedicels in fruit 0.5–2.5, rarely to 5 mm; fruit 2–4 mm wide, plano-convex. July.

Moist places, introduced. — Caucasus: W. Transc. (Batumi, Chakva), Tal. (Lenkoran). Gen. distr.: Ethiopia, Madagascar, on the American continent from the U. S. to Argentina. Described from Mexico. Type in London.

3. *H. ramiflora* Maxim. in Bull. Ac. Sc. Pétersb. XXXI (1887) 46; Grossg., Oprel. 213.

Perennial dull, glabrous plant; main stem decumbent, rooting at nodes, nearly leafless, producing from axils of ascending annual shoots leafy and flower-bearing branches, 10–15 cm long; leaves peltate-rounded, 1–2(3) cm wide, with notch usually imbricately covered; blade flat, very faintly 7-lobed, the lobes obtusely tricrenate; stipules large, broadly ovate, brown scarious. Peduncles exceeding adjacent leaves, apparently opposite; umbels capitate, many-flowered 2–3 m; fruit smooth. July.

Moist shady places. — Caucasus: W. Transc. (Colchis). Gen. distr.: Japan. Described from Hakodate. Type in Leningrad.

Note. This plant was certainly introduced. Recently it has started to spread in the subtropical regions of the USSR.

Genus 940. **CENTELLA** * L.

L. Pl. rar. Afr. (1760) 28 et in Amoen. Acad. VI (1764) 112 emend. Urban in Mart. et Eichl. Fl. Brasil. XI, 1 (1879) 286; Druce in E.-P. Pflanzenfam. III, 8 (1897) 119, pp.; Domin in Engl. Bot. Jahrb. XLI (1907) 155

Calyx-teeth absent; petals entire; disk flat at anthesis, becoming conical; 60 styles at inner margin of disk filiform; fruit laterally compressed, nearly

* Diminutive form of the word centrum (kentron) — spear, dart; referring to the small point on the unripe fruit consisting of the styles.

flat, with narrow commissure, bordered by main dorsal ribs, the median and lateral ribs arcuate, protruding, all ribs anastomosing; seeds compressed laterally. Decumbent perennial herbs rooting at nodes; leaves entire, crenate or nearly lobed; petioles dilated to scarious sheath, with 2 basal scales; inflorescence compound-umbelliform, subcapitate, few-flowered; leaflets of involucre 2-4; flowers often unisexual, terminal umbel fertile, 2 lateral umbels sterile.

About 20 species, most in South Africa and Madagascar; three are common to SE Asia, one is widespread in the USSR, where it has been introduced.

Type of species: *C. villosa* L.

1. *C. asiatica* (L.) Urban in Mart. et Eichl. Fl. Brasil. XI, 1 (1879) 287; Domin in Engl. Bot. Jahrb. XLI, 158; Grossg., Oprel. 213. - *Hydrocotyle asiatica* L. Sp. pl. (1753) 234; A. Rich. Monogr. 40. - Ic.: A. Rich. l.c.f. 11; Fl. Brasil. XI, 1, tab. 78, 1.

Perennial; stem creeping, juvenile stem pubescent, rooting at nodes, branching; leaves in bundles, rounded-reniform, 2-5 cm long, 7-9-nerved, regularly crenate, with deep, more or less open basal notch; petioles 3 to 5 times as long as blade, pubescent especially in upper part, nerves at base with 2 ovate scarious, wilting scales, blade with pubescent nerves.

Peduncles 2-4 in each bundle of leaves, half the length of the petioles or more, terminating in small head of 3-4 flowers; leaflets of involucre lanceolate, 3-4; flowers subsessile, pink; petals ca. 1.5 mm long; stamens half the length of the petals; fruit brown, ca. 3 mm long, 3-4 mm thick, 1 mm wide, ribbed, with anastomosing lateral ribs. July.

Moist localities, introduced. - Caucasus: W. Transc. (between Batumi and Salibauri). Gen. distr.: W. Iran, SE Asia - from Ceylon to Japan - Indonesia, Oceania. Described from India. Type in London.

Note. In E. Asia (Indonesia, China) this plant is used as a tonic and in the treatment of skin diseases. Its uses in the treatment of leprosy attracted the attention of researchers who recognized crystals of asiaticoside with the general formula $C_{54}H_{88}O_{23}$ (Nature, 1949, No. 4137).

Subfamily II. **SANICULOIDEAE*** Drude in E.-P. Pflanzenfam. III, 8 (1898) 135; Wolff in Pflanzr. Heft 61, 1. - Endocarp parenchymatous with
61 accumulations of crystals of calcium oxalate; fruit covered with scales, bristles or spines; styles 2; stylopodium annular-flat or infundibular; carpophore absent, intracostal or intercostal canals large; mericarps with 1 ovule. Flowers in heads or simple umbels.

Tribe 1. **SANICULEAE** Drude in E.-P. Pflanzenfam. III, 8 (1898) 135; Wolff in Pflanzr. Heft 61, 47. - Inflorescence of bisexual, sessile flowers or heads with bisexual and pistillate flowers on short pedicels with peripheral sessile pedunculate staminate heads disposed in simple umbels; calyx-teeth distinct; petals constricted with recurved lobe; stigma capitate.

* Treatment by E.G. Bobrov.

Genus 941. **SANICULA** * L.

L. Sp. pl. (1753) 235; Wolff in Pflzr. Heft 61, 48

Flowers in simple umbels, peripheral, staminate flowers pediceled, pistillate flowers sessile; calyx-teeth distinct; petals with recurved lobe; stylopodium flat; styles filiform, short or much longer than calyx-teeth; fruit oblong, covered with hamate spines; carpophore absent; mericarps smooth or granular, ventrally narrow; intercostal canals 5, large. Perennial and biennial herbs, with palmatipartite leaves with cut lobes, scariously dentate, the teeth terminating in bristles.

About 50 species from nearly all over the world, the Arctic and Australia excepted. The three Soviet species are associated with the herbaceous cover of broadleaved forests.

1. Flowers dark red; leaflets of involucre foliate, lanceolate or linear, to 3 cm long, 4 mm wide 1. *S. rubriflora* Fr. Schmidt.
- + Flowers greenish; leaflets of involucre small, often obsolete, 1–3 mm long 2.
2. Styles shorter than calyx-teeth; blades of radical leaves broadly rounded, the lobes broadly lanceolate; Far East. . . . 3. *S. chinensis* Bge.
- + Styles much longer than calyx-teeth; blades of radical leaves cordate or pentagonal-rounded, with cuneate lobes 2. *S. europaea* L.

- 62 Section 1. *ERYTHROSANA* Baill. Hist. pl. VII (1880) 536; Wolff in Pflzr. Heft 61, 60. — Leaflets of involucre large, foliate; petals dark red; distal part of fruit covered with hamate spines.

1. *S. rubriflora* Fr. Schmidt in Maxim. Prim. fl. amur. (1859) 123; Kom., Fl. Man'chzh. III, 1, 128. — Ic.: Kom. and Alis., Opred. rast. Dal'nevost. kr. II (1932) 796, table 242. — Exs.: G. R. F. No. 2637. —

Perennial with thick rhizome producing erect stem, often 2 stems 40–60 cm to 1 m high; radical leaves 2–8, on long thin petioles several times longer than blade; blade nearly tripartite; median lobe obovate-cuneate, 6–10 cm long, 4–8 cm wide, lateral lobes wider asymmetrical, cleft nearly to middle, all lobes with 3 more or less distinct lobules, bristly-crenate-serrate; cauline leaves sessile, nearly as long as the radical. Branches of inflorescence to 10 cm; leaflets of involucre foliate, lanceolate or linear, to 3 cm long, 4 mm wide; staminate flowers 10–15 on faceted, to 4 mm long pedicels; calyx-teeth lanceolate, ca. 1 mm long; petals dark red, broadly cordate, clawed, ca. 2.5 mm long; pistillate flowers ca. 1.5 mm long with acuminate calyx-teeth; styles recurved, 2 to 3 times as long as the petals; fruit subsessile, ovoid 5–6 mm long together with calyx-teeth; mericarps dorsally markedly convex, with recurved hamate spines, ventrally granular, canals very large. Fl. May, Fr. July.

Banks of forest streams, floodplain forests. — Far East: Uss. Gen. distr.: Manchuria, Korea. Described from the lower Amur near London. Type in Leningrad.

* From the Latin *sanare* — to treat, cure; medieval name referring to its use in healing wounds.



PLATE III. 1 — *Astrantia trifida* Hoffm.; 2 — *Actinolema eryngioides* Fenzl., habit, involucre;
 3 — *Actinolema macrolema* Boiss., involucre.

Section 2. EUSANICULA Wolff in Pflzr. Heft 61 (1913) 61. — Leaflets of involucre small, often obsolete; petals pale green; fruit with hamate spines from base.

2. *S. europaea* L. Sp. pl. (1753) 235; Ldb. Fl. Ross. II, 235; Boiss. Fl. or II, 832; Shmal'g., Fl. I, 385; Kryl., Fl. Zap. Sib. VIII, 2034; Grossg., Fl. Kavk. III, 119; Maevsk., Fl. Sr. Ross. ed. 7, 539. — *S. trilobata* Gilib. Exerc. phytol. (1795) 198. — *S. uralensis* Kleop. nom. in herb. and in Mat. po istorii fl. i rast. I (1941) 191, 197, 198. — *S. caspica* Gmel. in herb. — Ic.: Hegi, III. Fl. V, 2, Taf. 191, 1, a-e. — Exs.: G. R. F. No. 2636; Fl. cauc. exs. No. 96; Fl. pol. exs. No. 42; Dörfl. Herb. norm. No. 4892; Hayek, Fl. styr. No. 549.

- 65 Perennial; stems 40–80 (120) cm, erect, usually simple, solitary, rarely 2–3; radical leaves long-petioled, their blades cordate-rounded, 4–6 cm long, 6–10 cm wide, 3–5-partite, the median lobe larger, free nearly to base, the lateral united for one-third, broadly cuneate-obovate; lobes acuminate, more or less deeply 3-partite, unequally crenate-dentate, the teeth terminating in bristles, cauline leaves not as deeply cut, the terminal sessile. Inflorescence terminal, 3–4-furcate, the flowers terminating the rays of globular umbels; leaflets of involucre 4–6, linear, shorter than umbels; staminate flowers short-pedicel; calyx-teeth subulate, free, 1 mm long; petals ovate, with subtriangular, dentate, recurved lobe ca. 1.5 mm long; pistillate flowers 1 or few, styles spirally rolled, recurved, much longer than calyx-teeth; fruit ovoid-globular, 4–5 mm long, with hamate spines, dilated at base; mericarps ventrally flat, markedly convex; canals numerous, small. Fl. May–July, Fr. July–September.

Shady broadleaved, rarely mixed and coniferous forests mixed with broadleaved species, in Altai in black and mixed light forests. — European part: Balt., Lad.-Ilm. (extreme west), U. V. (SW), V.-Kama (Malmyzh south of Kirov Region, Bashkir ASSR, near Potashnya in Molotov [now Perm] Region), U. Dnp., M. Dnp., V. Don (in Gorki vicinity and north of Tambov Region), U. Dns., Bes., Crim.; Caucasus: in all regions, S. Transc. excepted; W. Siberia: Alt. (Kuznetsk Ala-Tau, Teletskoe Lake, Anos, Kebezen', upper reaches of Karasuk River). Described from mountain forests in W. Europe. Type in London.

Note. The European mercury has long been known to grow in the black forests of Altai, which points to the relict nature of this area. In an attempt to distinguish the plants from the Urals (V.-Kama) and Altai plants proper from the European plants, Yu. D. Kleopov (Mat. po istorii fl. i rast. SSSR, I, 1941) found them to differ from *S. europaea* L. in 1) the more narrowly cuneate lobes of the radical leaves; 2) the shorter styles and 3) the paler plant. In the lime woods of Kuznetsk Ala-Tau, there grows *S. europaea* Kleopov observed that *S. uralensis* "is easily distinguished from afar by the pale green of its leaves."

- 66 However, the characters mentioned by Kleopov are so poorly expressed and the available material is so inadequate that we cannot accept *S. uralensis*, the more so as it grows together with *S. europaea* in Kuznetsk Ala-Tau. *S. uralensis* Kleop. is probably an ecological form of the European mercury.

3. *S. chinensis* Bge. in Mém. Ac. Sc. Pétersb. II (1835) 106. — *S. elata* Franch. et Sav. Enum. pl. Jap. (1875) 178, p.p. non Hamilt.; Kom., Fl. Man'chzh. III, 130; Kom. and Alis., Oprod. rast. Dal'nevost. kr. II, 796; Sugawara, III. Fl. Saghal. III, 1373.

Biennial? Plant apparently monocarpous; stem 50–100 cm, erect, simple below, with long remote branches above middle, furcate above, the branches terminating with umbels; radical leaves on 20–35 cm long flattened, amplexicaul petioles, their blades subrounded, 3–5-partite, the median lobe nearly free, obovate, trifid; lateral lobes ca. 5 cm long, the proximal ones resembling the median, the distal ones lanceolate, multifid; all lobes bidentate or incised-dentate, with acuminate, setaceous denticles; upper leaves smaller, with lanceolate lobes. Leaflets of involucre 5–7, unequal, lanceolate, incised, not exceeding median umbel in dichasium, longer in the lateral; staminate flowers 1–2 in umbel, short-pedicelled; petals ca. 1 mm long; pistillate flowers 3–4, sessile, their petals slightly larger, greenish; styles erect, shorter than calyx-teeth; mericarps 4 mm long, intercostal canals 5. Fl. July, Fr. August.

Riparian woodlands, banks of forest streams. — Far East: Uss., Sakh. Gen. distr.: Jap.-Ch. Described from Panshan Mountain in N. China. Type in Paris.

Genus 942. **ASTRANTIA*** L.

L. Sp. pl. (1753) 235; Woron. in Tr. Bot. Sada Yur'ev. univ. 6 (1905) 67; Grintz. Monogr. in Ann. Conserv. Jard. Bot. Genève 13, 14 ann. (1910) 66–190; Wolff in Pflzr. Heft 61 (1913) 80

Flowers numerous, polygamous; calyx-teeth subulate, persistent, longer than petals, petals keeled, lanceolate, recurved; filaments long, exerted; stylopodium in pistillate flowers flattened, infundibular, in staminate flowers absent; styles thin, long, with capitate stigma; fruit oblong-cylindrical, slightly compressed dorsally, carpophore not developed, mericarps suborbicular, ventrally flat, main ribs covered with large vesicular
67 inflated scales, intercostal canals simple, large; endosperm flat inside, convex dorsally. Weakly branching perennial, erect herbs, with slightly leafy stems, leaves more or less deeply 3–5–7-sect or lobed, dentate, the teeth produced to bristles; umbels few, simple; leaflets of involucre large, often colored.

About 10 species in Central and Southern Europe, the Caucasus and Asia Minor. The Russian species belong to one section.

Section 1. **MACRASTER** Calest. in Webbia, I (1905) 128; Grintz. Monogr. 65; Wolff in Pflzr. Heft 61, 81. — Leaflets of involucre stiff, with 3–5 anastomosing nerves; calyx-teeth lanceolate, subulate; fruit oblong, 4–6 mm long.

1. Leaflets of involucre 8–13, broadly ovate-elliptic, ciliate-dentate in upper half; lobes of lower leaves 3–4 1. *A. maxima* Pall.
- + Leaflets of involucre 14–20, ovate-elliptic, entire or with 3–4 bilateral teeth above 2.

* From the Greek aster, astron — star, anti, antos — similar.

2. Plant 15–30 cm high; umbels 1.5–2 cm across; leaflets of involucre not exceeding flowers or fruit (from limestones in Abkhazia) 5. *A. colchica* Alb.
- + Plant 30–70 cm high, umbels larger; leaflets of involucre exceeding flowers and fruit 3.
3. Blades of lower leaves tripartite, lateral lobes emarginate (plant of W. Caucasus) 2. *A. pontica* Alb.
- + Blades of lower leaves (3)5–7-fid. 4.
4. Umbels 3.5–4.5 cm across; blades of lower leaves 3–5–7-fid, lobes large (western regions of European part of USSR) 3. *A. major* L.
- + Umbels 2.5–3 cm across; blades of lower leaves 5-, rarely 3-fid, lateral lobes cut (plant of N. Caucasus and E. Transcaucasia) 4. *A. trifida* Hoffm.

1. *A. maxima* Pall. in Nova Acta Petrop. VII (1793) 357, tab. XI; Grintz. Monogr. 65; Wolff in Pflzr. Heft 61, 82; Grossg., Fl. Kavk. III, 119. — *A. helleborifolia* Salisb. Prodr. hort. Chap. Allert. (1796) 159; Ldb. Fl. Ross. II, 236; Boiss. Fl. or. II, 831; Shmal'g., Fl. I, 385; Voron. in Tr. Bot. Sada Yur'ev. univ. VI, 67. — *A. heterophylla* Willd. in Neue Schr. 68 berl. Gesellsch. III (1801) 419; M. B. Fl. taur. cauc. I, 202, III, 195. —

A. caucasica β . *heterophylla* Spreng. in Schult. Syst. Veget. VI (1820) 342. — *A. caucasica* Spreng. Syst. Veget. I (1825) 874, p. p. — *A. speciosa* hort. — Ic.: Pall. l. c. tab. XI; Bot. Mag. tab. 1553; Grintz. Monogr. f. 2a, 7, 9a, 11a. — Exs.: G. R. F. No. 60; Herb. Fl. Cauc. No. 67.

Perennial; stem 40–70 cm, simple, sometimes with 1–2 small branches above, usually with 1 fully developed umbel; lower cauline leaves on petioles 3–4 times as long as the tripartite blades, blade with median lobe narrower than lateral, sometimes sublanceolate, 3–5 cm long, 1.5–2.5 cm wide, the lateral asymmetrical, slightly larger, bristly-dentate, with 3 prominent nerves beneath; rarely lower leaves quadripartite; median and upper cauline leaves sessile or amplexicaul, tripartite or 3-lobed, terminal leaves 2–3, ovate or lanceolate, 2–3-lobed or parted. Umbels 2–4.5 cm across; leaflets of involucre 8–13, thinly coriaceous, lanceolate or broadly lanceolate, greenish outside, reddish inside, acuminate, with 5–15 bilateral teeth tapering to 1 mm long bristles, later subglabrous, leaflets to 2.5 cm long, 1 cm wide, nearly twice as long as flowers; flowers many, pedicels ca. 1 cm, lobes of calyx narrowly lanceolate, stiff, ca. 3 mm long with subulate tip; petals narrowly cuneate, 1.5 mm long; styles in pistillate flowers hardly divergent, half the length of the sepals; fruit ca. 10 mm long, mericarps rounded in cross section, canals very large. July–August.

Meadows in upper part of timberline, alpine and subalpine belts. — Caucasus: everywhere except for Tal. Gen. distr.: Turkish Armenia. Described from Ossetia. Type in London.

2. *A. pontica* Alb. Prodr. Fl. Colch. (1895) 99; Voron. in Tr. Bot. Sada Yur'ev. univ. VI, 68; Grintz. Monogr. 74; Wolff in Pflzr. Heft 61, 83; Grossg., Fl. Kavk. III, 120. — Ic.: Grintz. Monogr. f. 2c, 9c.

Perennial; stem 30–70 cm high, simple, with 1–2 distal branches only, terminated by 3–4 umbels, the most highly developed on main stem;

petioles of lower cauline leaves 5–20 cm; blades with deeply cordate base, tripartite, median lobe obovate, 2–5 cm long, 1.5–3 cm wide, lateral lobes markedly asymmetrical, deeply cut, thus blade sometimes apparently 5-fid, 2–5 cm long, 1.5–5 cm wide, margin irregularly cut, bristly-dentate; cauline leaves short-petioled, trifid, the terminal sessile. Terminal and most developed umbel 2–3 cm across; leaflets of involucre 12–16, longer than flowers, lanceolate, tapering below, becoming acuminate, entire, pale green, rarely slightly reddish, 12–15 cm long, 2–4 mm wide; flowers many, peripheral, often staminate; calyx-teeth subulate, stiff, to 3 mm long; fruit 5–6 mm long, cylindrical, tapering at base; mericarps pentahedral or suborbicular, canals medium. Fl. June–July, Fr. July–August.

Subalpine meadows and grass plots, upper part of timberline. — Caucasus: Cisc. (W.), W. Transc. Endemic. Described from Abkhazia. Cotype in London.

3. *A. major* L. Sp. pl. (1753) 235, s. str.; Ldb. Fl. Ross. II, 236; Shmal'g., Fl. I, 385; Szaf., Kulcz., Pavl. Rosl. polskie, 436. — *A. major* ssp. *eu-major* Grintz. Monogr. (1910) 88. — *A. major* var. *eu-major* Wolff in Pflzr. Heft 61 (1913) 87. — Ic.: Grintz. l. c. f. 3a, 5, 12; Hegi, III. Fl. V, 2, Taf. 191, 2. — Exs.: Fl. polon. exs. No. 637; Fl. styr. exs. No. 366; Fl. exs. reip. Boh.-Slov. No. 437.

Perennial; stem 30–70 cm high, solitary simple or with 1–2 small branches, 2–5-partite above; lower leaves long-petioled, the blades 3–5–7-fid; lobes usually large, lanceolate, strongly 2-fid-dentate or cut, the teeth tapering to bristles; cauline leaves decreasing in size, sessile. Umbels 3.5–4.5 cm across; leaflets of involucre numerous (14–18), longer than flowers and fruit, narrowly lanceolate, cuneate beneath, fused at base, acuminate above, greenish or slightly reddish, entire or with 2–3 lateral spines, 3–5-nerved, more distinct beneath, 1.5–2 cm long; flowers many, on thin glandular pedicels, staminate flowers often peripheral; calyx-teeth narrowly lanceolate, acuminate or subulate, 1.5–3 mm long; petals obcordate-cuneate, shorter than or nearly as long as calyx-teeth; filaments long, exserted; fruit with sepals ca. 5 mm long, oblong-cylindrical. July–August.

Grass plots in forests and edges of broadleaved forests. — European part: Lad.-Ilm. (Pushkin, introduced into parks), U. Dnp. (SW), M. Dnp. (extreme west), Bes. (N.), U. Dns. Gen. distr.: Centr. Eur. Described from Switzerland. Type in London.

4. *A. trifida* Hoffm. Gen. pl. umb. ed. 1 (1814) VIII; Grintz. Monogr. 70; Wolff in Pflzr. Heft 61, 68; Grossg., Fl. Kavk. III, 120. — *A. major* var. *tridentata* Stev. in Fisch. Cat. Hort. Gorenk. (1812) 47. — *A. major* M. B. Fl. taur.-cauc. III (1819) 193, non L. — *A. calcasica* Spreng. Spec. umbell. (1818) 17 et in Schult. Syst. veg. VI (1820) 342, excl. var. — *A. intermedia* M. B. Fl. taur.-cauc. III (1819) 194; Ldb. Fl. Ross. III, 236. — *A. intermedia* var. β . DC. Prodr. IV (1830) 87, excl. pl. neapol. — *A. major* var. *intermedia* (M. B.) Boiss. Fl. or. II (1872) 830, quoad pl. cauc. — *A. biebersteinii* Trautv. in Ind. sem. Hort. Petrop. II (1835) 28; Ldb. Fl. Ross. II, 236; Boiss. Fl. or. II, 830; Grossg. Fl. Kavk. III, 120. — *A. major* var. *biebersteinii* Schmalh. Fl. I (1895) 385; Wolff in Pflzr. Heft 61, 86. — *A. major* ssp. *biebersteinii* Grintz. Monogr. (1910) 85. — *A. tridentata* Parrot,

Reise Krym.-Kauk. II (1815) 130, nom. — *A. orientalis* Woron. v. Tr. Bot. Sada Yur'ev. univ. VI (1905) 68. — *A. orientalis* var. *biebersteinii* Woron. l.c. — *A. orientalis* var. *intermedia* Woron. l.c. — *A. ossica* Woron. l.c. — Ic.: Grintz. Monogr. f. 3b, 9c, 11d (f. 2b, 9b incl.). Exs.: (sub *A. biebersteinii*) G.R.F. No. 264; Herb. Fl. Cauc. No. 86.

Perennial; stems 30–50 cm high, simple, with only branches in upper part, terminated by small umbels; petioles of lower leaves 3–5 times as long as the blade, blade 5-, rarely 3-partite, the lateral lobes cut, 2–3 cm long, 1.5–2 cm wide, emarginate-dentate, with teeth terminated by bristles. Terminal umbel larger, 2.5–3 cm across; leaflets of involucre 14–18, hardly exceeding flowers or fruit, 1.2–1.5 cm long, 3–4 mm wide, oblong-lanceolate, acuminate, sometimes with 1–2 terminal teeth, scarious, slightly reddish, scabrous; calyx-teeth subulate, hardly longer than petals, 1.5–1.8 mm long; fruit oblong, 5–7 mm long. Fl. July, Fr. August. (Plate III, Figure 1.)

Meadows, alpine and subalpine belts, descending to forest belt. — Caucasus: Cisc., Dag., E. Transc. Endemic. Described from specimens deriving from the high mountains of Georgia. Type lost.

Note. The complex synonymy is due to the faulty original description and the loss of the type specimens, presumably in the Moscow fire of 1812. Yet, all the names listed surely refer to a single species. Thus we agree with Yu. N. Voronov in considering Trautvetter's and Hoffman's descriptions to refer to one and the same species.

We have followed the rules of nomenclature in choosing the name of this species, although it is an unfortunate choice and has become the source of future errors. The later names of Bieberstein and Voronov are not legitimate.

5. *A. colchica* Alb. Prodr. Fl. colch. (1895) 100; Voron. in Tr. Bot. Sada Yur'ev. univ. VI, 67; Grintz. Monogr. 77; Wolff in Pflzr. Heft 61, 84; Grossg., Fl. Kavk. III, 120. — Ic.: Grintz. Monogr. f. 2d, 9d. — Exs.: Pl. or. exs. No. 143.

71 Perennial; stems 15–30 cm high, simple, usually with only 2 small distal branches terminated by umbels much smaller than the terminal; petioles of lower cauline leaves 3–10 cm, blades quinquepartite (more accurately — with deeply cut median lobe and 2 lateral lobes barely cut to one half [sic]), lobes ovate, 1–2.5 cm long, 0.7–1 cm wide, the lateral slightly asymmetrical, rather strongly bristly-dentate; cauline leaves 1, rarely 2, on much shorter proximally sheathing petioles, with smaller lobes. Umbel terminal, 1.5–2 cm wide; leaflets of involucre lanceolate, acuminate entire, sometimes with 1 or 2 teeth tipped by bristles, 6–10 cm long, 2–3 mm wide, pale green, sometimes slightly reddish, not exceeding flowers; staminate flowers often peripheral; calyx-teeth subulate, stiff, ca. 2 mm long, longer than petals; fruit 3–4 mm long, 1.5–2 mm across; canals narrow. Fl. August, Fr. September.

Limestones in alpine belt. — Caucasus: W. Transc. (Mingrelia). Endemic. Described from Mingrelia. Cotype in Leningrad.

Note. Presumably merely an echotype of *A. trifida* Hoffm. typical for high mountain limestones.

Genus 943. **ACTINOLEMA*** FENZL.

Fenzl, Pugill. pl. nov. Syr. et Taur. occ. (1842) 16; Wolff in Pflzr. Heft 61, 92

Flowers polygamous, the central bisexual, subsessile, the peripheral staminate, on long pedicels; calyx-teeth 5, sepals pentagonal, distally dilated, emarginate, produced to 3 mucros; petals cuneate, curved inwards with distinct dorsal nerve; stylopodium of bisexual flower flattened, with short styles; fruit ovoid-oblong, subsessile, slightly compressed dorsally, mericarps free, barely extending beyond calyx, subglobose, 5-ribbed, dorsally pectinate-dentate, bilaterally tuberculate; intercostal canals large, solitary. Low annual herbs, furcately branched above, with simple, few-flowered umbels, leaflets of involucre large, foliate, semitransparent, leaves entire.

Two species, in Asia Minor, Syria and Kurdistan.

1. Leaflets of involucre to 10 mm long; fruit ca. 5 mm long 1. *A. eryngioides* Fenzl.
- + Leaflets of involucre to 20 mm long; fruit ca. 10 mm long 2. *A. macrolema* Boiss.

- 72 1. *A. eryngioides* Fenzl. Pugill, pl. nov. Syr. et Taur. occ. (1842) 16; Boiss. Fl. or. II, 831; Wolff in Pflzr. Heft 61, 93. — Ic.: Fenzl. III. Taur. (1843) 67, tab. 12. — Exs.: Kotschy, Pl. alepp. kurd. moss. No. 210.

Annual; stems 15–25 cm high, pale green, glabrous, ribbed above, spreading-branching from base, branches occasionally leafy, distally furcate; radical leaves with long amplexicaul petioles, their blades obovate, tapering below, denticulate, 2–3 cm long, 1–1.5 cm wide, scabrous beneath along nerves; cauline leaves smaller, on shorter petioles, the terminal sessile, spinous-dentate. Leaflets of involucre 5–6, oblong, tapering below, dentate 3–5-nerved, nearly netted below, ca. 1 cm long, 4–5 mm wide, exceeding umbel; flowers greenish, the staminate 4–5; calyx-teeth sub-pentagonal, cuneate, ca. 2 mm long; petals obtriangular, ca. 1 mm long, pistillate flowers slightly larger than the staminate; styles as long as petals; fruiting pedicels ca. 1 mm. Fl. April, Fr. May–June. (Plate III, Figure 2.)

Clayey-stony parts of deserts. — Caucasus: S. Transc. (Nakhichevan District, Araks Gorge, between Negram and Darasham stations). Gen. distr.: E. Med. (Syria, Iraq), As. Min., Arm.-Kurd. Described from near Aleppo. Cotype in Leningrad.

2. *A. macrolema* Boiss. Fl. or. II (1872) 831; Wolff in Pflzr. Heft 61, 93; Grossg., Fl. Kav. III, 120; Tamamsh. in Tr. Tifl. bot. inst. I (1934) 153. — Ic.: Tamamsh., ibid., Fig. 3, 5, 6, 7a, 8–15. — Exs.: Sintenis, It. or. 1890, No. 2547.

Annual, 13–35 cm high; stems smooth, branching nearly from base, ribbed; radical leaves with winged amplexicaul petiole, blades 4–6 cm long, 2–4 cm wide, dentate with 5 anastomosing nerves; lowermost leaves small, broadly lanceolate, dentate. Umbels terminating axis of branching stem, encircled by 3 fused trilobate, acutely bristly-dentate, terminal leaves;

* From the Greek *actis* — ray, *radius* and *eilema* — involucre.

leaflets of involucre encircling simple umbels, 5–8, much longer than flowers and fruit, obovate, attenuate at base, obtuse, acutely spinous-dentate, with abruptly prominent nerves produced to spines, leaflets 1.5–2.5 cm long, 1–1.5 cm wide, in herbarium thin, semitransparent; single sessile bisexual flower surrounded by 5–8 staminate flowers on pedicels to 10 mm, calyx-teeth pentagonal, broadening distally, with notches and 3 mucros at apex; styles barely shorter than petals; ripe fruit sessile. April–June. (Plate III, Figure 3.)

- 73 Pebbly-clayey parts of semideserts and as weed of crops. – Caucasus: S. Transc. (Erevan vicinity). Gen. distr.: As. Min. Described from Pisidia. Type in Geneva, cotype in Leningrad.

Genus 944. **ERYNGIUM** * L.

L. Sp. pl. (1753) 232; Wolff in Pflzr. Heft 61 (1913) 106

Flowers bisexual in capitate inflorescences, surrounded by leaflets of involucre, each sessile in axil of lanceolate bract; calyx-teeth persistent, lanceolate, terminated by spine; petals emarginate, with recurved tip; fruit obovoid, back and sides with white cartilaginous scales, mericarps ventrally flat, glabrous; vittae distinct outside, carpophore absent. Perennial monocarpic or not monocarpic herbs, the base of the stem surrounded with leaves of former years; leaves chartaceous or coriaceous, entire or dissected, to twice pinnatisect, rounded, ovate, triangular or lanceolate, very rarely linear, usually spinous-dentate, the radical and lower cauline leaves petioled, the upper sessile.

More than 250 species in the warm and temperate zones of both hemispheres, with the exception of East Asia and South America. The Russian species belong to the Mediterranean, which in a broad sense is the geographical center of this genus, with about 60 species.

Note. Our review is based on H. Wolff's monograph, a reliable work for its time, though it suffers from an inadequate elucidation of the genetic relationship of the species. The generic taxonomy is provisional.

The species of the Old World, in this sense the broad Mediterranean, represent 12, often monotypic sections. This reflects the real relationships, since many species appear to be only relicts of extinct groups. Wolff's sections really approach species series. Nevertheless, his sections are retained, though new ones have been added.

Adding to the remarkable morphological diversity of the Russian *Eryngium* was Yu. N. Voronov's description of *E. wanaturi* Woron. in 1918, based on the collections of B. K. Shishkin from Armenia; in habit this species resembles the Mexican and Brazilian species, as well as the Kara-Tau endemic, described by M. M. Il'in.

1. Radical leaves entire, linear, 10–30 cm long, to 1 cm wide; cauline leaves lanceolate-linear 14. *E. wanaturi* Woron.
74 + Leaves rounded, ovate, triangular or lanceolate, in the latter case not less than 5 to 6 times as wide as long 2.

* *Erygion* – name of the plant in Dioscorides and Nicander.

2. Leaflets of involucre wide, rhombic or ovate 3.
- + Leaflets of involucre narrow, linear or lanceolate-linear, subulate ..
..... 4.
3. Leaflets of involucre oblong-ovate, spinose, cut-serrate, slightly
smaller than terminal leaves; heads oblong-ovate, 3-5(6) cm long,
3-4 cm wide 1. *E. giganteum* M. B.
- + Leaflets of involucre rhombic, trifid, with broadly triangular teeth,
spinose; heads subglobular, 1-2 cm becoming to 3 cm long; maritime
sands 13. *E. maritimum* L.
4. Radical leaves twice pinnatipartite, with decurrent lobes, stiffly
spinose-dentate, only first juvenile leaves entire 5.
- + Radical leaves entire, the youngest leaves only lobed, dying off
early 8.
5. Plant grayish-green; blades of lower leaves broadly ovate or sub-
orbicular, 10-30 cm long and wide 6.
- + Plants very pale or bluish-gray; lower leaves ovate or triangular,
4-10 cm long and wide 7.
6. Main axis of stem and inflorescence elongate; lobes of lower leaves
broadly decurrent along axes, especially the central axis nearly
winged, dentate 2. *E. noëanum* Boiss.
- + Main axis of stem and inflorescence shorter than lateral branches;
lobes of lower leaves faintly decurrent, axes not winged
..... 3. *E. campestre* L.
7. Plant bluish-gray, lower leaves with amplexicaul petioles exceeding
blade by half; blade broadly ovate, 6-10 cm long, with broad
profusely and acutely spinose-dentate lobes (S. and E. Transcaucasia)
..... 4. *E. nigromontanum* Boiss. et Buhse.
- + Plant very pale, petioles of lower leaves hardly broadened at base,
2 to 3 times as long as the blade; blade triangular, 4-6 cm long,
with narrow, largely spinose-dentate lobes (Greater Balkhan in Mtn.
Turkm.) 5. *E. balchanicum* Bobr.
8. Stems pale above; all radical leaves entire; bracts of all flowers
subulate or narrowly lanceolate, entire; leaflets of involucre entire,
with smooth margin, sometimes with small declinate spines confined
to base 9.
- 75 + Plant with stems bluish above; early radical leaves partly 3-lobed;
bracts of outer flowers 3-cuspidate or dentate; leaflets of involucre
awned-dentate or bristly-spinose 13.
9. Blades of radical and lower cauline leaves ovate, slightly cordate
or short-cuneate at base, 12-20 cm long, 4-8 cm wide 10.
- + Blades of radical and lower cauline leaves oblanceolate, decurrent
along petiole, 8-15 cm long, 2-4 cm wide 12.
10. Petioles of radical leaves shorter than blades, the latter shortly
and cuneately tapering to base, very rarely slightly emarginate
(Mtn. Turkm.) 8. *E. bungei* Boiss.
- + Petioles of radical leaves $1\frac{1}{2}$ times as long as the blades, the
latter with faintly cordate base (Pam.-Al., T. Sh.) 11.
11. Radical and lower cauline leaves compactly chartaceous, with short
fine acute teeth, 20-30 teeth on each side
..... 6. *E. macrocalyx* Schrenk.

- + Radical and lower cauline leaves coriaceous, not withering, large-toothed, 10–15 spinose teeth on each side 7. *E. incognitum* Pavl.
- 12. Plant not monocarpic; stems 15–40 cm high; radical leaves narrowly oblanceolate, blade decurrent along petiole, the latter $\frac{1}{5}$ to $\frac{1}{8}$ the length of the blade; heads 3–5, leaflets of involucre 7–11 9. *E. karatavicum* Iljin.
- + Plant monocarpic (?); stems 40–60 cm high; radical leaves nearly withering, oblanceolate, tapering to petiole, these not more than $\frac{2}{3}$ the length of the blade; heads 5–10; leaflets of involucre 7–9 10. *E. mirandum* Bobr.
- 13. Radical leaves thin, soft, dying early, 4–5 cm long, 3–4 cm wide; heads globular, ca. 1 cm across; leaflets of involucre 4–6, strongly declinate, (2)3–4 times as long as the heads 12. *E. biebersteinianum* Nevski.
- + Radical leaves numerous, stiff, long persistent; 5–15 cm long, 2–7 cm wide; heads ovate, ca. 1.5 cm long; leaflets of involucre 5–8, not more than twice as long as heads 11. *E. planum* L.

Section 1. ALPINA Wolff in Pflzr. Heft 61 (1913) 123. — Radical leaves large, entire, long-petioled; heads broadly cylindrical; leaflets of involucre large, barely smaller than terminal leaves; bracts 3-cuspidate.
 76 *E. alpinum* L., from the mountains of S. Europe, is also included here.

1. *E. giganteum* M.B. Fl. taur.-cauc. I (1808) 201; Ldb. Fl. Ross. II, 238; Boiss. Fl. or. II, 829; Schmal'g., Fl. I, 383; Voronov in Vestn. Tifl. Bot. Sada, X, 5; Wolff in Pflzr. Heft 61, 124; Grossg., Fl. Kavk. III, 121. — *E. glaucum* Adams. ex Hoffm. Hort. Mosq. (1808) 15 No. 1309, nom. — Ic.: Wolff, l.c. 125.

Perennial, 0.5–1.5 m high, pale green, juvenile often bluish; main root thick; stems 0.7–1.5 m high, 1–1.5 cm thick at base, furcate above, to 3 branches, these often furcate in turn; leaves coriaceous, with netted venation, radical leaves broadly cordate or cordate-triangular, 10–15 cm long and as wide, entire, irregularly crenate-dentate, petioles 20 cm, lower cauline leaves ovate, sessile, broadly amplexicaul, entire, acutely spinose-dentate, the lower sometimes larger than the radical, decreasing in size upward, the terminal deeply cleft. Inflorescence loose, heads on thick stipes, oblong-ovoid, 3–5(6) cm long, 3–4 cm across; leaflets of involucre 6–10, large, exceeding heads scarcely smaller than terminal leaves, oblong-ovate, 4–6 cm long, spinose, cleft-serrate; bracts to 10 mm long, 3-cuspidate above; flowers numerous, calyx-teeth lanceolate, elongating into spinose cusp; fruit to 10 mm long, broad, subrectangular laterally, dorsally covered with numerous scales. Fl. July, Fr. August.

Meadows of upper mountain belt. — Caucasus: Cisc. (central and western parts of the Main Range), W. Transc., E. Transc. (central part of Main Range), S. Transc. Gen. distr.: As. Min. (Pontus Range), Arm.-Kurd. (Ararat). Described from mountainous Armenia. Type in Leningrad.

Section 2. CAMPESTRIA Wolff in Pflzr. Heft 61 (1913) 140, subsection EUCAMPESTRIA Wolff, l. c. 146. — Radical leaves large, twice pinnatipartite, stiffly spinose-dentate, decurrent along axis; bracts entire, sometimes with spines above. Four species from the Balkans, Asia Minor, Lesser Armenia, Kurdistan and Iran are also included here.

2. *E. noëanum* Boiss. Diagn. ser. II, 2 (1856) 72; Ej. Fl. or. II, 824; Wolff in Pflzr. Heft 61, 152. — *E. sapphyrinum* Tamamsch. in herb. —

Perennial grayish-green plant; base of stem covered with fibrous remains of petioles; stems 40–75 cm high, erect, cylindrical, becoming
77 whitish, paniculately branching above, sometimes turning blue; radical leaves on long thick 10–25 cm long petioles, which sometimes slightly exceed these blades, suborbicular or broadly ovate, 10–20 cm long, 10–15 cm wide, twice pinnatipartite, the lobes large, spinose-dentate, broadly decurrent making the main axis nearly winged; lower cauline leaves on short, broad, subamplexicaul petioles, their blades much smaller, stiffer and acutely spinose-dentate; upper leaves at base of branches to 5 cm long, subsessile or with short amplexicaul petioles, acutely spinose. Leaflets of involucre to 3 cm long, usually 6–7, rarely 8, if so then clearly unequal, linear-subulate, rarely narrowly lanceolate, $1\frac{1}{2}$ times as long as the heads, sometimes with small basal spines; bracts 6–7 mm long, stiff, subulate, longer than flowers; styles twice as long as calyx-teeth, the latter bluish, lanceolate, with sharply protruding nerve tapering to cusp as long as fruit; fruit ovoid, ca. 5 mm long, densely covered dorsally with scarious scales, larger at margin than at base. Fl. July, August, Fr. August–September.

Stony mountain slopes. — Caucasus: S. Transc. (near Artyk and Artvin); Centr. Asia: Mtn. Turkm. (C. Kopet Dagh). Gen. distr.: Arm.-Kurd., Iran. Described from Karind, W. Iran. Type in Geneva.

Note. Yu. N. Voronov first reported this species from the Caucasus in 1908. It was discovered in the former Artvin District. The latest collections by S. G. Tamamshyan and A. A. Fedorov are from near Artyk, in Armenia. The intense blue coloration of the upper part of the Artyk specimens led S. G. Tamamshyan to propose a new species, distinct from the S. European *E. amethystinum* L. However, these specimens, as well as the plant from Artvin, should surely be included in *E. noëanum* Boiss., based on Noël's collection from W. Iran as defined in Wolff's monograph (l. c.), which is thus distributed from the western part of the Lesser Armenia and Kurdistan area of the Russian "Flora," to the east of the Iranian area, where it was collected many times by E. G. Chernyakovskaya in Khorasan where A. Bunge made his previous discoveries. The Ashkabad specimen collected in 1897 by D. I. Litvinov should also be included. Since this species is very widespread in Khorasan, it will certainly also be found in Kopet-Dagh. It is incredible that Litvinov's findings have not been repeated to date, even though the flora of the Ashkhabad area has been thoroughly
78 studied. E. G. Chernyakovskaya mentions that the different parts of the stem and leaves of this species exude a red substance.

3. *E. champestre* L. Sp. pl. (1753) 233; M. B. Fl. taur.-cauc. II, 201, III, 193; Ldb. Fl. Ross. II, 237; Shmal'g., Fl. I, 384; Voronov in Vestn.

Tifl. Bot. Sada, X, 5; Wolff in Pflzr. Heft 61, 150; Grossg., Fl. Kavk. III, 122. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 1852. — Exs.: G. R. F. No. 1067; Fl. cauc. exs. No. 347; Fl. pol. exs. No. 173.

Perennial with long, cylindrical root; stems 30–70 cm high; entire plant grayish-green, stiffly spiny; stems thick, leafy, branching, strongly branched above, especially in inflorescence, with numerous heads; leaves stiffly coriaceous, the radical long-petioled, broadly ovate-triangular, 15–30 cm long and as wide, deeply twice 3-partite, the lobes decurrent along axis, spinose-dentate (primary leaves broadly lanceolate, subentire), cauline leaves much smaller, short-petioled, amplexicaul. Inflorescence loose, umbelliform, with numerous ovate-globular ca. 15 mm long heads, leaflets of involucre 6–7, linear-lanceolate, mucronate, to 4 cm long, 5 mm wide, sometimes with 2–4 basal spines; bracts subulate, to 10 mm long exceeding flowers; calyx-teeth lanceolate, with long mucro; fruit compressed-obovoid, to 5 mm long, lateral scales longer than dorsal. June–September.

Steppe zone, steppe lowlands, weedy places, roadsides, in mountain regions on steppe and herbaceous slopes, not on high mountains. — European part: U. V. (Kalinin, introduced), M. Dnp., V.-Don, Transv. (Birska, introduced), U. Dns., Bes., Bl., Crim., L. Don, L. V. (west, apparently not reaching east of the Volga); Caucasus: Cisc., Dag., W. Transc. (N.), E. Transc. Gen. distr.: Centr. Eur., W. and E. Med., Bal.-As. Min. Described from S. Europe. Type in London.

4. *E. nigromontanum* Boiss. et Buhse, Aufz. Pfl. Reise Transk. Pers. (1860) 95; Grossg., Fl. Kavk. III, 122. — *E. billardieri* γ *meiocephalum* Boiss. Fl. or. II (1872) 824; Voronov in Vestn. Tifl. Bot. Sada, X, 8. — *E. billardieri* ssp. *nigromontanum* (Boiss. et Buhse) Wolff in Pflzr. Heft 61 (1913) 150.

79 Pale, usually bluish-gray perennial, 40–80 cm high; stem rather thick, furcate branching to produce spreading inflorescence, commonly confined to upper half or third; lower leaves on long (10–15 cm) amplexicaul petioles $1\frac{1}{2}$ times as long as blades; blades broadly ovate, 6–10 cm long, contiguous deeply twice to 3-partite with rather broad, profusely and acutely spinose-dentate lobes; upper cauline leaves sessile, deeply 3-partite, with spreading-acuminate, spinose-dentate lobes. Heads 12–15 mm long, globose-ovoid; leaflets of involucre 6–8(9), subulate, 2–4 cm long, with 2–3 thin marginal spines and basal spines which appear to alternate with leaflets; bracts subulate, ca. 10 mm long, exceeding flowers, sometimes spinose above; calyx-teeth acuminate, as long as fruit; fruit compressed, dorsal scales numerous, rounded. July–September.

Pebbly slopes of central mountain belt. — Caucasus: E. and S. Transc., Tal. Gen. distr.: Arm.-Kurd., Iran (NW). Described from Kara Dag Range. Cotype in Leningrad.

5. *E. balchanicum* Bobr. n. sp. in Addenda XV, 423.

Perennial with straight woody main root; entire plant very pale green; stems usually 2, 40–60 cm high, their base covered with leaves of preceding years, slightly branching in upper third; 10–15 cm long petioles of radical leaves 2 to 3 times as long as the blade, slightly broadened at base;

blades triangular, 4–6 cm long, deeply 3-partite (the lower unequal-sided), the broadly ovate lobes decurrent along axis, lobes deeply, nearly pinnately cut into lanceolate spreading-acuminate spinose teeth, the nerves whitish, very sharply protruding beneath; the first, early dying leaves smaller, and less rigidly spinose on shorter petioles; cauline leaves few, sessile, also deeply dissected, with narrower lobes. Inflorescence loose, heads 10–20, globular, 10–12 mm long; leaflets of involucre 6–7, subulate, 3–4 cm long, 2–3 mm wide, spinose-acute, with 2–3 basal spines, the outermost recurved; flowers 20–30, subtended by lanceolate acuminate bracts, longer than flowers; calyx-teeth long, lanceolate, short-acuminate, as long as fruit; fruit markedly compressed, with winglike margins due to broad cartilaginous scales, dorsally less sharply winged, with scales confined to upper part. Fl. June. (Plate IV, Figure 4.)

Among shrubby formations on pebbly mountain slopes. — Centr. Asia: Mtn. Turkm. Greater Balkhan Range, from where described. Type in Leningrad.

E. balchanicum differs from *E. nigromontanum* Boiss. et Buhse by the smaller radical leaves, the subtriangular, largely spinose-dentate blades, on petioles 2 to 3 times as long as the blade, smaller flower heads, fewer flowers, the fruit is much less densely covered with scales, but along the ribs it is nearly winged by scales.

80 Section 3. OVALIFOLIA Bobr. sect. n. — Blades of radical and lower cauline leaves entire, ovate, slightly cordate or short-cuneate at base.

6. *E. macrocalyx* Schrenk in Fisch. et Mey. Enum. pl. nov. (1841) 60; Ldb. Fl. Ross. II, 238; O. and B. Fedch., Perech. r. Turk. III, 78, p. p.; Wolff in Pflzr. Heft 61, 122.

Monocarpic perennial with thick main root; stems ca. 1 m high, white, shiny, 3–4-partite above, with furcately 3-partite branches; radical and lowermost cauline leaves ovate, entire, firm, chartaceous or thin, coriaceous, dying early, 14–20 cm long, 6–8 cm wide, faintly cordate at base, shortly and finely acutely toothed, with 20–30 teeth at each side, petioles thin, $1\frac{1}{2}$ times as long as blade, amplexicaul; median and upper cauline leaves sessile, much smaller, ovate to lanceolate, becoming more firmly coriaceous upwards with larger acute teeth. Heads ovoid to globular, ca. 2 cm long, 1.75 cm across, surrounded by involucre of 6–7, sublinear, spinose-acuminate, stiff leaflets, 2–2.5 cm long, 2–4 mm wide; bracts narrowly subulate, acuminate, ca. 8 mm long, longer than flowers; flowers numerous; sepals 4–5 mm long, ovate, truncate, with thick midrib produced into spinose cusp, ca. 2 mm long; fruit ca. 5 mm long, with numerous lateral scales, the distal ones produced into 1.5 mm long spines. Fl. June, Fr. July. (Plate IV, Figure 3.)

Semisteppes foothills and lower mountain belt. — Centr. Asia: Balkh. (extreme east), Dzu.-Tarb. (habitat in Tarbagatai very doubtful), T. Sh., Syr D. (in Fergana up to Osh and Alai Range in the east). Gen. distr.: Dzu.-Kash. (Kuldja). Described from Ala-Kul in Dzungaria. Type in Leningrad.

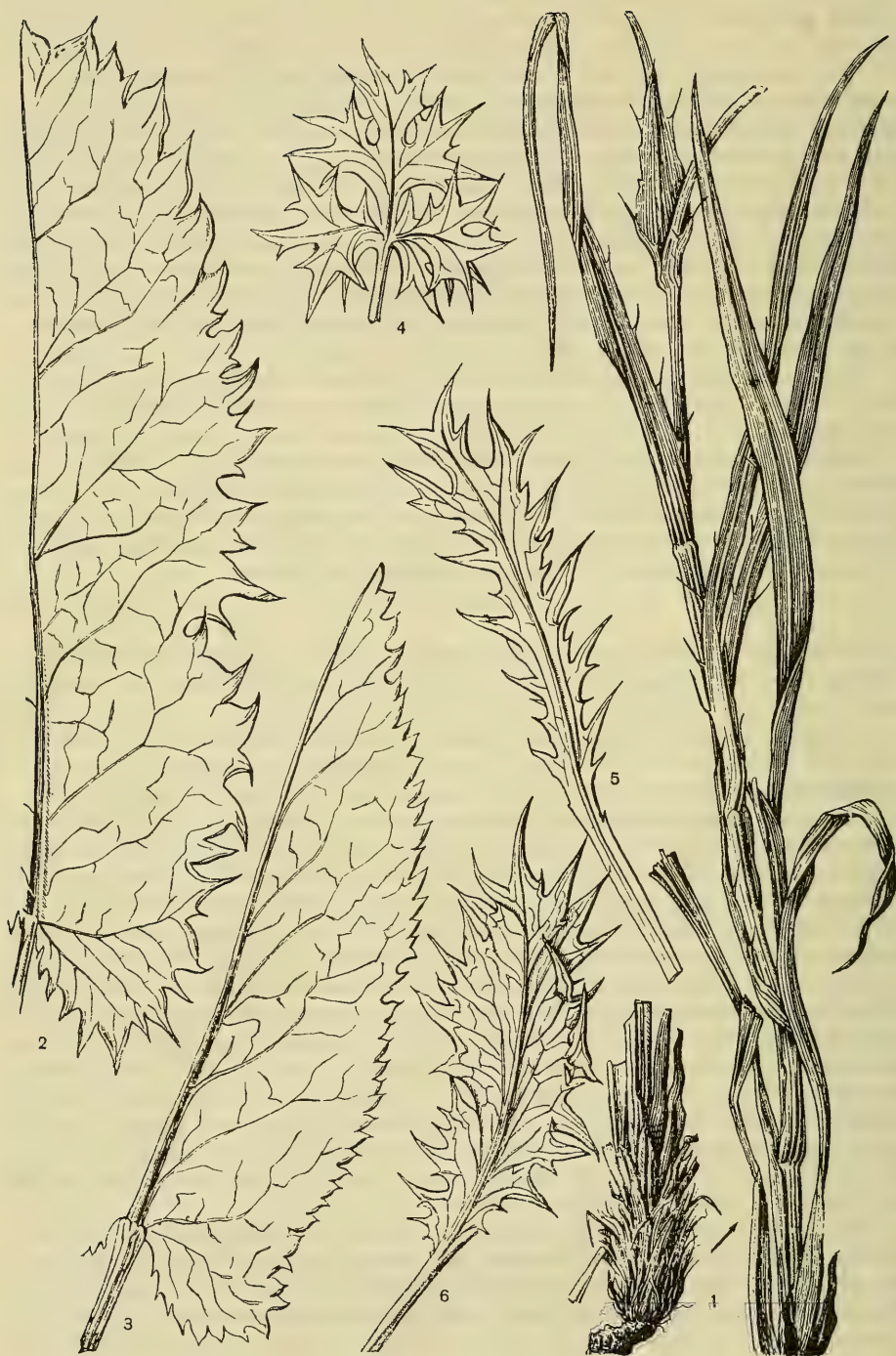


PLATE IV. 1 - *Eryngium wanaturi* Woron., lower part of plant; 2 - *E. incognitum* Pavl., part of blade of lower cauline leaf; 3 - *E. macrocalyx* Schrenk, part of blade of lower cauline leaf; 4 - *E. balchanicum* Bobr., blade of lower cauline leaf; 5 - *E. karatavicum* Iljin, lower cauline leaf; 6 - *E. mirandum* Bobr., lower cauline leaf.

7. *E. incognitum* Pavl. in Byull. Mosk. Obshch. Ispyt. Pr. XLVII (1938) 81. — *E. pamiralaicum* Korov. in Bot. Mat. Gerb. Inst. Bot. i Zool. AN UzSSR, VIII (1947) 3.

Large monocarpic perennial, closely resembling the preceding species from which it is distinguished by large coriaceous spinose-dentate, radical leaves, which do not wither, with 10–15 spinose teeth at each side; 83 cauline leaves correspondingly smaller, spinose-dentate, nearly pinnatifid. Fl. June, Fr. July. (Plate IV, Figure 2.)

Semisteppes and steppes of foothill and central mountain belts. — Centr. Asia: Pam.-Al. Described from Stalinabad. Type in Moscow.

Note. The type of this species, in the Herbarium of Moscow University, has been damaged by animals and lacks radical leaves. Even so it surely belongs to the closely related *E. macrocalyx* Schrenk of Pamir-Alai, subsequently described in much greater detail by E. P. Korovin as *E. pamiralaicum* Korov. Presumably it is owing to the poor state of this plant that its author has compared it with Il'in's *Eryngium Karatau* rather than with the species established by Schrenk.

E. octophyllum Korov. described by E. P. Korovin from Zeravshan (Bot. Mat. Gerb. Inst. Bot. i Zool. AN UzSSR, VIII (1947) 3) seems to represent a distinct form of *Eryngium* more closely related to *E. macrocalyx* Schrenk than to the species from Pamir-Alai species, and may be their hybrid. It is characterized by rather small, coriaceous leaves and sparingly leafy stems. One of the significant characters of this species is the long leaflets of the involucre (to 5 cm), 2 to 3 times as long as the head.

8. *E. bungei* Boiss, Fl. or. II (1872) 824; Wolff in Pflzr. Heft 61, 119. — Ic.: Wolff, l. c. f. 5, E. F.

Perennial, not monocarpic; stem 1, rarely 2–3, 0.7–1 m high, sparingly leafy, spreading-branching above, with branches to 20 cm long, twice-thrice furcate; radical leaves few, coriaceous, petioles shorter than blades, these to 15 cm long, 4 cm wide, lanceolate, shortly and cuneately tapering at base, rarely slightly emarginate, with 12–15 spinose teeth ca. 1 cm long, sometimes recurved; cauline leaves smaller, with relatively larger and fewer attenuate spinose teeth and shorter petioles; upper leaves sessile, spreading spinose-lobed. Heads 1–1.5 cm long; leaflets of involucre usually 6, stiff, narrowly linear, spinose, 4–5 cm long, 2–4 mm wide, entire, with small declinate basal spines; bracts lanceolate, curved above; fruit 7–8 mm long; sepals ca. 3 mm long, coriaceous, truncate with ca. 1 mm long spine, dorsally and laterally covered with flattened, cartilaginous lanceolate scales. Fl. June, Fr. July.

Mountain semideserts and steppes. — Centr. Asia: Mtn. Turkm. (Kopet-Dagh and Lesser Balkhan). Gen. distr.: Iran. Described from Iranian Khorasan. Cotype in Leningrad.

84 Section 4. LANCIFOLIA Bobr. sect. n. — Blades of radical and lower cauline leaves oblanceolate, decurrent on petiole.

9. *E. karatavicum* Iljin in Fedde, Repert. XXIX. (1936) 320.

Perennial, not monocarpic; stems 15–40 cm high, pale, straight, surrounded below by leaves of former years, slight branching confined to upper part; radical leaves not withering, narrowly oblanceolate, gradually tapering, decurrent, 8–15 cm long, to 3 cm wide in upper part, midrib sharply protruding beneath, margin acutely spinose-dentate, teeth to 1.5 cm long, petiole $\frac{1}{5}$ to $\frac{1}{8}$ the length of the blade; cauline leaves sessile, amplexicaul, the blades reduced to 3–5 lobes-spines, the upper leaves reduced to lanceolate spine with 2 small basal prickles. Heads 3–5, globular, 1.5–2 cm long; involucre of 7–11 leaflets, 1.5–4 cm long, not more than twice as long as head, subulate, spinose, entire; bracts subulate, strongly keeled, the sharply protruding nerve produced into cusp; fruit dorsally and laterally pectinately covered with flattened, cartilaginous scales. Fl. June–July, Fr. July–August. (Plate IV, Figure 5.)

Pebbly mountain slopes – Centr. Asia: T. Sh. (Kara-Tau Range). Endemic. Described from Goldenensai in Kara-Tau. Type in Leningrad.

10. *E. mirandum* Bobr. n. sp. in Addenda XV, 423.

Perennial, monocarpic? Stems solitary, 40–60 cm high, erect, whitish, with remains of few leaves at base, 6–8 mm thick in lower part, branching above, branches of middle part of stem short, with 1 head; radical leaves 5–6, readily withering, oblanceolate, tapering to petiole, petiole not more than $\frac{2}{3}$ the length of the blade; blades 8–10 cm long, to 4 cm wide in upper part, acutely spinose-dentate, with 8–10 unequal, spinose-acute attenuate teeth on each side; median and lower cauline leaves sessile, amplexicaul, of similar shape, larger and more acutely spinose, the upper lanceolate, nearly pinnate with large spinose teeth. Heads 5–10, 1–3 on solitary, in median part of stem, the others on branches in upper part of stem, globular, 1–2 cm long; involucre of 7–9, 1.5–3 cm long, subulate, entire leaflets not more than twice as long as head; bracts lanceolate, keeled, acuminate, longer than flowers; fruit 7–8 mm long, covered dorsally and laterally with white cartilaginous scales denser and longer in upper part of fruit; calyx-teeth slightly shorter than half the length of fruit, the midrib produced into cusp. Fr. June. (Plate IV, Figure 6.)

Pebbly slopes of outliers. – Centr. Asia: Kyz. K. (outliers of Bel-Tau), Pam.-Al. (Nura-Tau). Endemic. Described from Bel-Tau. Type in Leningrad.

Differs from *E. karatavicum* Iljin by the nearly withering radical leaves tapering to petioles not more than half the length of the blades.

Section 5. *PLANA* Wolff in Pflzr. Heft 61 (1913) 126. – Radical leaves entire, oval, with cordate or rounded base, the young leaves sometimes 3-lobed, with oblong 2-fid or 3-fid lobes; leaflets of involucre linear or linear-lanceolate, 2 to 4 times as long as heads; bracts of inner flowers entire, subulate, the outer 3-cuspidate or dentate. In addition to 2 Russian species, this section includes 6–7 Mediterranean species.

11. *E. planum* L. Sp. pl. (1753) 233; Boiss. Fl. or. II, 823; Shmal'g., Fl. I, 384; Wolff in Pflzr. Heft 61, 127; Kryl., Fl. Zap. Sib. VIII, 2036; Grossg., Fl. Kavk. III, 121. – *E. alpinum* Pall. Reise, I (1771) 31, nom. –

E. planifolium Pall. l.c.III (1776) 316, nom. — *E. amethystinum* Gmel. Reise II (1774) 196, nom. — *E. latifolium* Gilib. Fl. lithuan. IV (1785) 33. — *E. coeruleum* Gilib. l.c. 33. — *E. pusillum* Gilib. l.c. 34, non L. — ? *E. pumilum* Gilib. Chlor. Grodn. (1785) 20. — *E. intermedium* Weinm. in Bull. Soc. Nat. Mosc. X, 7 (1837) 59; Ldb. Fl. Ross. II, 239. — Ic.: Fl. Yugo-Vost. V, fig. 508. — Exs.: G. R. F. No. 416; Fl. exs. austro-hung. No. 1352.

Perennial with straight main root; stems solitary, 30–80 cm, to 1 m high, sometimes few, smooth, branching in upper part, often bluish, surrounded at base by remains of dead leaves; leaves stiff or thin-coriaceous, the radical 5–15 cm long, 2–7 cm wide, entire, the petioles as long as the blades; blades oblong or ovate or obovate, obtuse above, spinose-dentate or crenate, subcordate at base; cauline leaves sessile, much shorter, the upper 3–5-partite, dentate. Heads ovoid, ca. 1.5 cm long, ca. 1 cm across; leaflets of involucre 5–7, stiff, linear, acuminate, cuspidate-dentate, 2–3 cm long, 2–6 mm wide; bracts 5–6 mm long, thinly acuminate, the lower 3-cuspidate, the upper entire, as long as calyx; calyx-teeth lanceolate, acuminate, elongating into long (ca. 2 mm) spine; petals hardly shorter than lobes of calyx, oblong, with narrow fimbriate 86 recurved lobe; fruit compressed-ovoid, 5–6 mm long, usually covered to middle with narrow flat acuminate scales. Fl. June–July, Fr. July–August.

Forb and grassy steppes, semidesert zones of river valleys, forest steppes and forest zones in dry valleys and sands. — European part: U. V. (S.), V.-Kama (S. and S. Urals), U. Dnp. (S.), M. Dnp., V-Don, Transv., U. Dns., Bes., Bl., Crim. (N.), L. Don, L. V.; Caucasus: Cisc., Dag., E. Transc. (Tbilisi, Gori, Akhaltsikhe); W. Siberia: Ob (S.), U. Tob., Irt., Alt. (lowlands and foothills); Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh. (southernmost locality, mouth of Charyn). Gen. distr.: Centr. and S. Eur., Dzu.-Kash. (W.). Described from E. Europe (European Russia, Poland). Type in London.

12. *E. biebersteinianum* Nevski in Tr. Bot. Inst. AN SSSR, ser. 1, 4 (1937) 275, nom. — *E. coeruleum* M. B. Tabl. prov. casp. (1798) 112; Ej. Fl. taur.-cauc. I (1808) 200, excl. syn. non Gilib. 1785; Boiss. Fl. or. II, 823; Shmal'g., Fl. I, 384; Voronov in Vestn. Tifl. Bot. Sada, X, 6; Wolff in Pflzr. Heft 61, 130; Grossg., Fl. Kavk. III, 122. — *E. dichotomum* Ldb. Fl. Ross. II (1844) 240, non Desf. — ? *E. caucasicum* Fisch. ex Steud. Nomencl. (1821) 315, nom.; Trautv. in Tr. B. S. I, 23. — *E. amethystinum* auct. Fl. cauc. — Exs.: G. R. F. No. 1768, a, b; Herb. Fl. Cauc. No. 338.

Perennial; with thick main root, stems to 1 m high, usually solitary, spreading-branching above, bluish, leafy; radical leaves many, herbaceous or slightly coriaceous, soft, early withering, long-petioled, the blades with cordate or rounded base, 4–6 cm long, 3–4 cm wide, oval, entire or 3-lobed, with oblong lobes; cauline leaves coriaceous, sessile, 1–4 cm long, 2–4 mm wide, deeply incised, with spinose-rooted lobes. Heads ca. 10 mm long and as wide; leaflets of involucre 4–6, linear-lanceolate, stiff, strongly declinate, 2 to 4 times as long as the heads, with 1–2 basal spines, sometimes bristly-spiny along margin, with spinose-acuminate apex; bracts subulate, the outer sometimes 3-toothed (var. *fallax* Woron.), longer

than flowers; calyx-teeth oblong-lanceolate, acuminate; petals ca. 2 mm long; styles longer than sepals; fruit ca. 5 mm long, angular, scales lanceolate, long-acuminate, equal. Fl. May-July, Fr. July-September.

Steppes and semideserts, foothill and lower levels of mountains. - Caucasus: Cisc. (rare in the east), Dag., W., E. and S. Transc., Tal.; Centr. Asia: T. Sh., Pam.-Al., Mtn. Turkm. Gen. distr.: Arm.-Kurd., Iran. (to Kashmir in the east). Described from the Shirvan Steppe. Type in Leningrad.

- 87 Section 6. HALOBIA Calest. in Webbia, 1 (1905) 126; Wolff in Pflzr. Heft 61, 121. - Blades of radical leaves stiff coriaceous (live leaves fleshy), rounded; petioles not shorter than blades. Monotypic section.

13. *E. maritimum* L. Sp. pl. (1753) 233; M. B. Fl. taur.-cauc. I, 201; Ldb. Fl. Ross. II, 238; Boiss. Fl. or. II, 829; Shmal'g., Fl. I, 384; Voronov in Vestn. Tifl. Bot. Sada, X, 4; Wolff in Pflzr. Heft 61, 122; Grossg., Fl. Kavk. III, 121. - *E. maritimum tauricum* Fisch. Cat. Hort. Gorenk. (1812) 47. - Exs.: Schulz, Herb. norm. No. 2641; Fl. ital. exs. No. 1707.

Bluish-gray perennial, 40-70 cm high; stem robust, ca. 1 cm thick at base, spreading-branching, above with forked branches; petioles of radical leaves not shorter than blades; blades hard-coriaceous, rounded, entire, rarely 3-lobed, median lobe much smaller than the lateral, largely spinose-dentate, with sharply prominent nerves; cauline leaves decurrent on short broad petiole, deeply trifid, with teeth tapering into spines. Heads globular, 1-2 cm becoming 3 cm long; involucre of 5, rhombic, 2-4 cm long, trifid, leaflets with broadly triangular-spinose teeth; bracts to 12 mm long, exceeding flowers, 3-cuspidate; calyx-teeth lanceolate, tapering to cusp, to 5 mm long; fruit compressed-ovoid, 12-15 mm long, with large lateral scales, the upper nearly spinose in ripe fruit. Fl. July, Fr. August.

Sandy and stony seacoasts. - European part: Balt. (to Ezel' Island in the northwest), Bes., Bl., L. Don, Crim.; Caucasus: W. Transc. Gen. distr.: Atl., Eur., W. and E. Med., Bal.-As. Min. Described from sandy shores of W. Europe. Type in London.

- Section 7. HAPLOPHYLLA Woron. in Izv. Kavk. Muzeya, XI (1918) 55. - Leaves entire, linear, the upper lanceolate-linear, similar to leaves of *Bupleurum*. Monotypic section.

14. *E. wanaturi** Woron. in Izv. Kavk. Muzeya (1918) 54; Grossg., Fl. Kavk. III, 121. - *E. woronowii* E. Bordz. in Fedde, Repert. XXXVI (1934) 303.

Perennial; stems 35-50 cm high, solitary, bluish above, branching slightly above, base covered with remnants of dead leaves; leaves coriaceous, entire; radical leaves linear, 10-30 cm long, to 1 cm wide, tapering to poorly developed petiole; nerves longitudinal, the median and marginal thickened; cauline leaves shorter, amplexicaul, the upper to 1.5 cm
88 wide at base, lanceolate-linear, elongating, with few bristly spines at margin;

* Named after ancient Armenian god protecting the traveler.

uppermost leaves shorter, bifid. Inflorescence of 2-5 globular heads, 1-1.5 cm long; leaflets of involucre 7-9, spinose, linear, margin bristly-spinose, especially in lower part; bracts lanceolate, curved, longer than flowers, the outer sometimes with 1-2 prickles; petals blue, deeply 2-partite above; calyx-teeth lanceolate, with spinose cusp; fruit dorsally covered with cartilaginous scales. Fl. June, Fr. July. Plate IV, Figure 1.)

Stony slopes, high mountain belt. - Caucasus: S. Transc. (Daralagez, Karny Yarykh). **Gen. distr.:** Arm.-Kurd. Described from Sandzhan, near the upper reaches of the Euphrates. Cotype in Leningrad.

Subfamily III. **APIOIDEAE** Drude in Pflanzenfam. III, 8 (1898) 145. - Fruit with soft-parenchymatous endocarp without raphides, sometimes becoming hard, nut-shaped through lignification of the subepidermal layer; styles apical on stylopodium; in young ovaries canals vallecular, becoming variously distributed.

Tribe 1. **ECHINOPHOREAE** Benth. et Hook. Gen. Pl. (1867) 862. - Flowers unisexual, monoecious, receptacle of umbel dilated; 1 central-sessile pistillate flower and pedicelled staminate flowers; calyx-teeth foliate, hardening; petals in staminate flowers curved inwards, in pistillate flowers erect; styles elongate, erect, hard; fruit oblong-pyramidal, 1-seeded through abortion of one cell; pericarp scarious with 1-3 canals in valleculae.

Genus 945. **ECHINOPHORA** * L.

L. Sp. pl. ed. 1 (1753) 239

Flowers heterogenous, the central bisexual, sessile in umbel, pistillate with 5 foliate calyx-teeth, the outer staminate, pediceled; calyx of staminate flowers with oblong-lanceolate posterior teeth, the other flowers very small; petals white or yellow, emarginate; ovary adnate to pedicels of staminate flowers, buried in receptacle; stylopodium conical; styles straight or curved, much longer than stylopodium; fruit oblong-pyramidal, basally thickened through adnation to receptacle and pedicels of sterile flowers, subcylindrical in cross section; ribs obsolete; canals singly
89 under valleculae; albumen at commissure deeply emarginate, with inturned margins. Stiff perennial herbs, branching from base, pubescent or glabrous, with bipinnate or tripinnate leaves.

Ten species distributed in S. Europe, N. Africa, Asia Minor, Transcaucasia and Central Asia.

1. Plant entirely glabrous; lobes of last order filiform, 1.5-8 cm long, 0.2-0.3 mm wide; petals white, glabrous, the outer expanding in umbel 1. *E. trichophylla* Smith.

* From Greek echinos - spine, phoros - bearing.

- + Plant densely covered with short hairs; leaf lobes of the last order short, lanceolate-linear; petals yellow, dorsally pubescent, with ciliate margins, outer ones not in umbel 2. *E. sibthorpiana* Guss.

Section 1. *LEUCOPHORA* DC. Prodr. IV (1830) 230. — *Euechino-phora* Boiss. Fl. or. II (1872) 947, p. p. — Petals white, glabrous, the marginal petals expanding.

1. *E. trichophylla* Smith in Rees Cycl. XII (1819) No. 3; DC Prodr. IV, 235; Ldb. Fl. Ross. II, 355; Boiss. Fl. or. II, 948; Grossg., Fl. Kavk. III, 123. — Ic.: Jaub. et Sp. III. or. tab. 239. — Exs.: Fl. cauc. exs. No. 214. —

Perennial, glabrous throughout; root ca. 1 cm thick, ascending or erect; stem thin, strong, finely striated, 10–60 cm high, branching nearly from base or only in upper part with spreading, subhorizontal or obliquely antrorse branches; radical leaves numerous, ovate-oblong, 20–40 cm long, 8–15 cm wide, bipinnate or tripinnate, the thinly filiform lobes of the last order 1.5–8 cm long, 0.2–0.3 mm wide. Umbels 1.5–4 cm across, with 10–12 thickish, irregular rays scabrous above; involucre of 5 linear-lanceolate, thin-acuminate leaflets becoming reflexed; umbellets 6–8 mm across; involucels of 5–6 lanceolate, acute, erect leaflets nearly as long as umbellets; calyx-teeth in staminate flowers unequal, often very short, the posterior lanceolate-subulate; petals white, the marginal ca. 1.5 mm long; stylopodium obsolete; styles divergent, often arcuate, ca. 3 mm long. July–August. (Plate V, Figure 1.)

Dry stony slopes and in desert steppes. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. (Khishe-Kala), Iran. Described from the Levant. Type in London.

Section 2. *CHRYSOPHORA* DC Prodr. IV (1830) 230. — *Euechino-phora* Boiss. Fl. or. II (1872) 947, p. p. — Petals yellow, the marginal not increscent, ciliate.

- 90 2. *E. sibthorpiana* Guss. Suppl. Fl. Sic. Prodr. (1832–1943) 69; Boiss. Fl. or. II, 949; Grossg., Fl. Kavk. III 123. — *E. tenuifolia* M. B. Fl. taur.-cauc. III (1819) 199, non L. — *E. tenuifolia* var. *Sibthorpiana* Griseb. Spicil. Fl. Rumel. et Bith. (1843) 386. — Ic.: Sibth. Fl. Graec. tab. 266.

Perennial; root vertical, 4–5 mm thick; stems 20–50 cm high, striate-spreading-branching nearly from base, like leaves densely covered with short spreading hairs; radical leaves 25–30 cm long, ca. 20 cm wide, broadly ovate, bipinnate-tripinnate, short-petioled, abruptly dilated to sheath; primary lobes sessile, narrowly oblong, secondary lobes ovate, pinnatifid, lobules lanceolate-linear, acute or irregularly acutely toothed; cauline leaves sessile, the uppermost simple-pinnate, with 2–3 short dentate lobules. Umbels numerous, 1–1.5 cm across, with 2–5 short hairy rays; leaflets of involucre 2–5, lanceolate or narrowly lanceolate, densely pubescent; umbellets 0.5–0.7 mm across; involucels of 5 lanceolate, pubescent leaflets as long as umbellets, becoming stiff, procumbent or

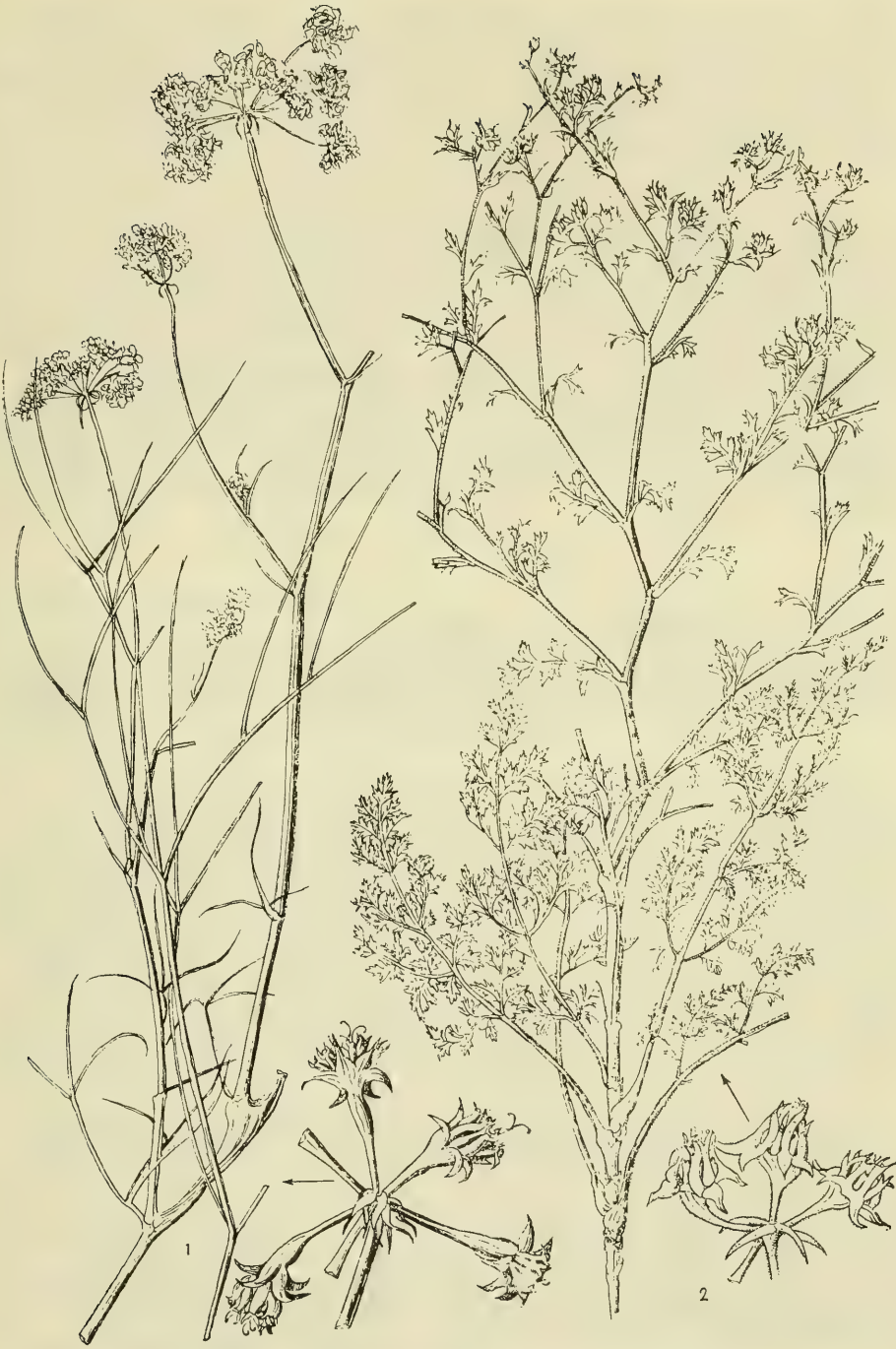


PLATE V. 1 - *Echinophora trichopylla* Smith; 2 - *E. sibthorpiana* Guss.

recurved; petals yellow, ca. 1 mm long, dorsally pubescent, with ciliate margin. Fl. August, Fr. September–October. (Plate V, Figure 2.)

Stony slopes, solonchastic desert steppes, cotton crops, wheat, vineyards, irrigated ditches, railroad beds. — Caucasus: E. and S. Transc.; Centr. Asia: Syr D., Pam.-Al. Gen. distr.: Bal.-As. Min., Arm.-Kurd., Iran. Described from Greece.

Tribe 2. SCANDICEAE DC. Prodr. IV (1830) 220, emend. Drude in Pflanzenf. III, 8 (1898) 146. — Flowers bisexual or polygamous, often bisexual flowers mixed with staminate, central flower of each umbellet usually fertile, all flowers on more or less long pedicels; styles erect or recurved on conical stylopodium; fruit 2-seeded, oblong-cylindrical, sometimes growing into more or less elongate cylindrical or flattened beak; mericarps with 5 filiform or flat ribs; canals 1–4 under valliculae, 2–8 at commissure, often obliterated in ripe fruit; druses of crystals abundant in parenchyma surrounding carpophore; seeds long, narrow, with more or less deep furrow at commissure; pericarp often covered with tubercles, bristles or prickles.

93 Genus 946. **PHYSOCAULIS*** (Dc.) Tausch

Tausch in Flora, XVI (1834) 342. — *Dasyspermum* Neck. Elem. I (1790) 295, p.p. — *Chaerophyllum* sect. *Physocaulis* DC. Coll. mém. V (1829) 59; DC. Prodr. IV (1830) 225. — *Fieberia* Opiz, Seznam (1852) 44. — *Biasolettia* Bertol. Fl. ital. III (1837) 191, non Koch (1836)

Flowers bisexual; calyx-teeth inconspicuous; petals white, obcordate, deeply notched, with incurved lobe; fruit narrowly oblong, pyramidally tapering from broad base, slightly compressed laterally, covered with antrorse bristles sessile on tubercles; mericarps subrounded at cross section; pericarp very thick, 1-layered epicarp, 1–3 layers of chlorenchyma, parenchyma, and columns of sclerenchymatous plates; main ribs 5, broad, flat, separated by narrow valliculae; vallicular canals solitary, large; albumen deeply canaliculate-notched, horseshoe-shaped in cross section. Annuals with ternate, bipinnate leaves.

A monotypic Mediterranean genus distributed from Algeria and Portugal to the Crimea, Caucasus, Iran and Syria.

1. *P. nodosus* (L.) Tausch in Flora (1834) 342 et in Koch, Taschenb. (1844) 232; Boiss. Fl. or. II, 909; Kozo-Pol. in Fl. Az. Ross. 15 (1920) 90; Grossg., Fl. Kavk. III, 123. — *Scandix nodosa* L. Sp. pl. (1753) 257. — *Chaerophyllum nodosum* Crantz, Cl. Umbell. Emend. (1767) 76; Ldb. Fl. Ross. II, 349; Shmal'g., Fl. I, 423. — *Torilis macrocarpa* Gaertn. Fruct. I (1778) 183. — *T. tumida* Moench, Meth. (1794) 102. — *Anthriscus nodosa* Pers. Synops. I (1805) 320. — *A. scandix* M. B. Fl. taur.-cauc. I (1808) 231, nec Aschers. — *Biasolettia nodosa* Bertol. Fl. Ital. III (1837) 191. — *Fieberia nodosa* Opiz, Seznam (1852)

* From the Greek *physa* — vesicle and *kaulos* — stem; referring to the inflated nodes of the stem.

44.— Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 2015; Kozo-Pol., in Fl. Az. Ross. XV, 86, fruit; Briquet in Festschrift zur Feier des siebzigsten Geburtstages Prof. Ascherson (1904) S. 352, fruit in cross section.

Annual; stems branching, 20–100 cm high, covered in lower part with long retrorse bristly hairs, glabrous above, with bluish stripes, internodes hollow, inflated below nodes; leaves ternate-binate, densely covered with appressed, antrorse, bristly hairs; lobes of the first order petioluled, of the last order obtuse, abruptly short-acuminate. Umbels of 2–3(5) rays covered with rigid antrorse hairs, in fruit divergent, slightly thickened; 94 involucre absent (rarely of 1–2 leaflets); umbellets with 5–10 rays; leaflets of involucre 5, triangular-lanceolate or linear, herbaceous, thinly acuminate, scabrous; petals with few bristles outside; fruit 8–15 mm long. May–June.

Forests, shrubby formations, stony slopes. — European part: Crim.; Caucasus: Cisc. [Krymskaya, Stavropol], W. Transc. (Novorossiisk), E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm., Pam-Al. Gen. distr.: W. Med., Bal.-As. Min., Iran. (Astrabad province); introduced in France and England. Described from Sicily. Type in London.

Genus 947. **CHAEROPHYLLUM*** L.

L. Sp. pl. (1753) 258.— *Lindera* Adans. Fam. II (1763) 493.— *Polgidon* Raf. Good Book (1840) 52.— *Rhynchosstylis* Tausch in Flora, XVII (1843) 343, non Blume.— *Balansaea* Boiss. et Reut. Pug. pl. nov. (1852) 49.— *Bellia* Bubani, Fl. Pyren. II (1900) 411.— *Selinum* subgen. *Chaerophyllum* Krause in Sturm, Deutsch. Flora, 2 Aufl. XII (1904) 50.— *Golenkinianthe* K.-Pol. in Tr. Yur'ev. Bot. Sada, XV (1914) 107; Russk. Bot. zhurn. (1915) 13; in Fl. Az. Ross. 15 (1920) 43

Calyx-teeth inconspicuous; petals white, pink, red or purple, obcordate, deeply notched, with inward curved lobule in notch, cuneate at base or abruptly passing into short claw; marginal petals often elongate; fruit oblong-cylindrical or narrowly ellipsoid, tapering but beakless, slightly flattened laterally. Mericarps subrounded or obtusely 5-angled, the 5 obtuse, slightly flattened, smooth, main ribs distinctly protruding when ripe; canals large, solitary in valliculae; stylopodium conical, sometimes short-conical bearing filiform or thickish styles, recurved below, rarely erect or divergent; albumen with longitudinal furrow. Herbaceous tuberous biennials (rarely root cylindrical) or rhizomatous perennials, the leaves many times pinnatisect.

A genus of forty species in temperate Europe, Asia and America (4 species).

- | | | |
|------|---|--------------------------|
| 1. | Biennials with tuber, rarely annuals with simple thin root fusiform | 2. |
| 97 + | Perennials, with rhizome or thick root | 11. |
| 2. | Root thinly fusiform; umbels with 6–12 scabrous-bristly rays | 11. <i>C. temulum</i> L. |

* From the Greek name, referring to the agreeable scent of the foliage.



PLATE VI. 1 - *Chaerophyllum borodinii* Alb; 2 - *Ch. confusum* Woron; 3 - *Ch. angelicifolium* M.B.

- + Root tuberiform; umbel rays glabrous, very rarely scabrous-bristly 3.
3. Lower and median leaves 2-7 cm long, 1-3.5 cm wide, biternate, the ovate lobes dentate or pinnatisect (Caucasus) 4.
- + Leaves tripinnate, lobes of the last order linear or oblong 7.
4. Leaflets of involucels glabrous 14. *C. meyeri* Boiss. et Buhse.
- + Leaflets of involucels with ciliate or villous margins 5.
5. Petals red, pink or violet 15. *C. confusum* Woron.
- + Petals white 6.
6. Umbel rays glabrous; styles straight, slightly divergent 13. *C. angelicifolium* M. B.
- + Umbel rays scabrous-bristly; styles recurved below 16. *C. temuloides* Boiss.
7. Marginal petals strongly elongate (to 4 mm); leaflets of involucels covered with soft hairs 17. *C. crinitum* Boiss.
- + Marginal petals not elongate, if elongate then not exceeding 2 mm; leaflets of involucels glabrous, very rarely with few rigid bristles 8.
8. Involucels of 6-10 equal leaflets; styles straight, thickish, becoming divergent; stem often hairy nearly to apex ... 21. *C. prescottii* DC.
- + Involucels of 3-5 unequal leaflets; styles thin, recurved from base; stem glabrous in upper half 9.
9. Marginal petals elongate to 2 mm; fruit often small, 4-5 mm long ... 19. *C. caucasicum* (Fisch.) Schischk.
- + Marginal petals not elongate; fruit 5-6 mm long 10.
10. Marginal leaf lobes of the last order oblong-linear, 1-2 mm wide; fruit 5-6 mm long; nearly all flowers in umbellet fertile (European part of USSR) 18. *C. bulbosum* L.
- + Leaf lobes of the last order ovate or oblong, 2-5 mm wide; fruit 5 mm long; often 1-4 fertile flowers in umbel (Turkmen SSR) 20. *C. bobrovii* Schischk.
- 98 11. Petals white or slightly pinkish 12.
- + Petals pink-red or purple 20.
12. Fruit exceeding 15 mm; only 1 fertile in umbel 12. *C. macrospermum* (Willd.) Fisch. et Mey.
- + Fruit not exceeding 13 mm; all or few flowers in umbel fertile ... 13.
13. Plants characteristic of high mountain taluses, with slightly developed, slightly leafy stems not exceeding 20 cm in height. 14.
- + Plants with leafy stems 30-100 cm high 15.
14. Leaflets of involucels ciliate; umbel rays more or less densely villous 4. *C. humile* Stev.
- + Leaflets of involucels glabrous; umbel rays glabrous or remotely hairy 5. *C. klapazi* Woron.
15. Petals with ciliate margins 3. *C. cicutaria* Vill.
- + Petals not ciliate along margin, sometimes dorsally pubescent ... 16.
16. Umbels of 3-6 rays 17.
- + Umbels of 10-20 rays 18.
17. Stems in lower part and leaves densely covered with stiff hairs, entire plant canescent 10. *C. khorossanicum* Czernjak.
- + Stems and leaves glabrous or subglabrous 9. *C. borodinii* Alb.

18. Leaf lobes of the last order narrowly linear; leaflets of involucels ovate, white-membraneous, the juvenile entirely covering umbellets; fruit 4–5 mm long 8. *C. astrantiae* Boiss. et Bal.
- + Leaf lobes of the last order ovate; leaflets of involucels of different shape and shorter than leaflets of umbellets; fruit 7–13 mm long 19.
19. Cauline leaves bi-quadrupinnatisect; lobes of the last order poorly developed, triangular-lanceolate, acuminate, with broad base in lower part bidentate 1. *C. aromaticum* L.
- + Cauline leaves bi-quadrupinnatisect; lobes of the last order developed, triangular-lanceolate, acuminate, with broad base in lower part deeply pinnatisect or pinnatipartite, becoming less divided above, with dentate or entire tip 2. *C. maculatum* Willd.
20. Leaflets of involucels long-subulate, longer than umbellets; fruit 4–5 mm long 6. *C. roseum* M. B.
- + Leaflets of involucels as long as, sometimes shorter than umbels; fruit 6.5–7.5 mm long 7. *C. rubellum* Alb.

Subgenus 1. *Nomochaerophyllum* K.-Pol. in Bull. Soc. Nat. Mosc. 99 XXIX (1915) 141. — Perennials, rarely annuals or biennials, tuberless; in umbellets with many or few flowers.

Series 1. *Aromatica* K.-Pol. in Bot. Mat. Gerb. IV (1923) 189, emend. — Perennials; umbels of 10–20 rays; petals white or purple, glabrous, leaf lobes of the last order ovate.

1. *C. aromaticum* L. Sp. pl. (1753) 259; DC. Prodr. IV, 227; Ldb. Fl. Ross. II, 353; Shmal'g., Fl. I, 425; Grossg., Fl. Kavk. III, 128. — *Scandix aromatica* Roehling, Deutschl. Flora (1796) 153; Wahl in Oken, Iris, XXI (1826) 984. — *Myrrhis aromatica* Spreng. in Schult. Syst. Veg. VI (1820) 509. — *Selinum aromaticum* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 67. — Ic.: Jacq. Fl. Austr. II, tab. 150 (1774); Rchb. Pl. crit. VI, t. 514 (1828). — Exs.: G. R. F. No. 2613; Fl. Finl. exs. No. 305.

Perennial; rhizome thick, horizontal or ascending; stem erect, 50–200 cm high, branching, rather deeply furrowed when dry, nodes more or less inflated, lower part covered like petioles with long (1–2 mm) stiff, retrorse, whitish hairs sessile on tubercles, upper part subglabrous; leaves gray-green, with short appressed sparse hairs above or subglabrous, with short bristles along nerves below, twice or nearly thrice ternately compound; lobes of the last order elliptic or obovate, 4–10 cm long, 1.5–5 cm wide, acuminate, thinly bidentate; lower leaves long-petioled, upper leaves sessile on short sheaths with scarious margin often bearded at base, less compound. Umbels of 12–20 smooth rays; involucre obsolete or of 1 deciduous leaflet; leaflets of involucels 7–9, broadly lanceolate, broadly scarious, long and thinly acuminate, with ciliate margin, becoming reflexed; petals white, glabrous, obovate, 2-lobed for one-third; fruits in each umbel few or single, cylindrical, 8–13 mm long, ca. 3 mm

across, pale brown with dark longitudinal stripes; styles filiform, 2 to 3 times as long as the conical stylopodium; column 2-partite at tip. July, Fr. August.

Shrubby formations, alder stands, thinned-out forests, cliffs. — European part: Kar.-Lap. (S.), Lad.-Ilm., Balt., U. Dnp., U. V., Dv. -Pech., V.-Kama (W.), V.-Don, M. Dnp., Bl., Bes., U. Dns. Gen. distr.: Centr. Eur., Med., Bal.-As. Min. (Balkans). Described from Europe. Type in London.

2. *C. maculatum* Willd. Enum. pl. Horti Berol. Suppl. (1816) 15; DC. 100 Prodr. IV (1830) 226; C. Koch in Linnaea, XVI (1842) 364. — *Ch. aureum caucasicum* Fisch. in Cat. Horti Gorenk. (1812) nom. nud.; Schult. Syst. VI (1820) 512. — *Myrrhis maculata* Sweet, Hort. brit. ed. 1 (1827) 189. — *Ch. aureum* α *glabriusculum* Ldb. Fl. Ross. II (1844–1846) 352, non Koch. — *Ch. aureum* var. *maculatum* Boiss. Fl. or. II (1872) 906. — *Ch. aureum* subsp. *maculatum* Hand.-Mazz. in Annal. K. K. Natur. Hofmus. Wien, XXIII (1909) 174. — *Ch. aureum* Schmalh., Fl. I (1895) 424, non L.; Grossg., Fl. Kavk. III, 127. — *Ch. ghilanicum* Stapf et Wettst. in Denkschr. Acad. Wien, LXI (1886) 54. — Ic.: Willd. Hort. berol. II, t. 107 (1816).

Perennial; root rather thick; stem solitary, erect, 50–150 cm high, branching, slightly furrowed, somewhat thickened below nodes, with stiff retrorse hairs below, spreading-hairy or glabrous above, often with violet spots; leaves triangular, more or less densely covered with semiapressed hairs, tripinnatisect, their blade 10–20 cm long and nearly as wide, the petioles as long as blades or longer, gradually broadening to narrow, oblong sheath; lower primary lobes on petiolules, the upper sessile, lobes of the last order ovate or lanceolate, acuminate, with ciliate margin, proximally deeply and irregularly dentate or pinnatisect. Umbels of 10–20 glabrous irregular rays, 3.5–8 cm across, crowded in fruit; involucre obsolete; umbellets 6–10 mm across; leaflets of involucels 5–7, ovate or lanceolate, acuminate, long-ciliate, reflexed in fruit; petals white, 2–2.5 mm long, the marginal hardly elongate; fruit oblong-linear, 8–12 mm long, ca. 2 mm thick; stylopodium short-conical; styles recurved, to twice as long as stylopodium. June–July, Fr. July–August.

Beech, hornbeam-beech, ash-maple, oak and mixed forests, forest edges. — European part: Crim.; Caucasus: Cisc., Dag., W. and E. Transc. Gen. distr.: Bal.-As. Min., Arm.-Kurd., Iran. Described from the Caucasus: Type was in Berlin.

Series 2. *Hirsuta* K.-Pol. 1.c. — Perennials; petals with ciliate margin.

3. *C. cicutaria* Vill. Prosp. (1779) 26, non Rchb. — *Ch. hirsutum* Ldb. Fl. Ross. II, 353, non L.; Schmal'g., Fl. I, 424; Grossg., Fl. Kavk. III, 125. — *Ch. palustre* α *glabrum* Lam. Encycl. Meth. I (1783) 683, p.p. — *Ch. hirsutum* subsp. *Cicutaria* (Gaud.) Thell. in Hegi, III. Fl. V, 2 (1926) 1008. — *Ch. hirsutum* var. *Cicutaria* Gaud. Fl. Helv. II (1818) 195. — *Myrrhis cicutaria* Spreng. Umbell. Prodr. (1813) 29. — *Selinum kochii* E. H. L. Krause in Sturm Fl. Deutschl.

ed. 2, XII (1904) 66. — Ic.: Coste, Fl. Franc. II, 222. — Exs.: G. R. F. No. 2614.

- 101 Perennial; root long, its neck covered with dead petioles; stem erect or ascending, 30–120 cm high, thick, cylindrical, furrowed, shiny; leaves, with exception of upper ones, long-petioled, broadly triangular, ternate, pinnately compound, the lower primary lobes nearly as long as remaining part of leaf, bristly-hairy, rarely subglabrous, the lower side often shiny. Umbels of 10–20 glabrous rays; involucre 0 or of 1–2 deciduous leaflets; involucels of 5–10 lanceolate, long-acuminate, irregular leaflets with scarious ciliate margin, becoming reflexed; petals white, very rarely pink, notched for $\frac{1}{4}$ to $\frac{1}{3}$, with short inturned tip, margin more or less densely ciliate; fruit oblong-linear, to 12 mm long, ca. 2 mm wide, nearly as long as or longer than pedicel; ribs as wide as dark valliculae, stylopodium conical; styles 2–3 times as long as stylopodium, divergent; carpophore thickened above base, tapering at both ends, split for $\frac{1}{3}$. June–July.

Boggy meadows, banks of streams and creeks in coniferous and alder stands, in shady ravines. — European part: U. Dns. Gen. distr.: Med., Eur., Bal.-As. Min. (Balkans). Described from France. Type in Paris(?).

Series 3. *Humilia* K.-Pol. l.c. emend. — Low alpine plant, with poorly developed slightly leafy stem; petals white, glabrous.

4. *C. humile* Stev. in M. B. Fl. taur.-cauc. III (1819) 240; DC. Prodr. IV, 227; Ldb. Fl. Ross. II, 352; Boiss. Fl. or. II, 907; Grossg., Fl. Kavk. III, 125. — *Myrrhis humilis* Schult. Syst. veg. VI (1820) 519.

- Perennial; acaulescent or with short simple stems 2–25 cm long; root vertical, 0.8 cm thick; stems and peduncles numerous, procumbent or ascending, with short, sparse pubescence or subglabrous, nearly always densely soft-hairy below umbel; radical leaves oblong or ovate, bipinnatisect, the primary lobes on more or less long petiolules cut into oblong or ovate acute lobules. Umbels of 4–7 rays 1.5–3 cm across, the rays unequal, more or less densely villous-hairy; involucre 0 or of single linear-oblong, reflexed or spreading, villous-hairy leaflet; involucels of 6–7 ovate broadly scarious leaflets with villous-ciliate margin, becoming reflexed below; umbel rays glabrous or sparingly pubescent; petals white; fruit short-cylindrical, 4–7 mm long, ca. 1 mm wide; ribs thickly filiform; stylopodium
102 conical; styles short, becoming recurved. June–July. (Plate VII, Figure 3.)

Glacial moraines, taluses in alpine zone, 2,500–3,500 m. — Caucasus: Cisc., Dag., E. and W. Transc. Endemic. Described from sources of the Ksani River. Type in Leningrad.

5. *C. kiapazi* Woron. sp. n. in Addenda XV, 424.

Perennial; plant glabrous or with scattered hairs; root vertical or ascending, 5 mm thick; stems few or many, weak, ascending, 1–30 cm long, sometimes reduced to single few-branched peduncle; radical and lower cauline leaves long-petioled, oblong, bipinnatisect, with petiolular primary lobes, lobules broadly linear, acute, 2–4 mm long, 0.5–0.75 mm wide; petioles broadened into oblong sheaths, sometimes with densely ciliate margin; upper leaves smaller. Umbels on long (5–12 cm) peduncles,

2–3 cm across, of 4–8 unequal, glabrous or remotely hairy rays, markedly elongating in fruit; involucre 0 or of single scarious glabrous or villous-obovate-oblong leaflet; involucels of 5–7 ovate, broadly membranous acute or obtuse, glabrous or ciliate. Sometimes dorsally villous reflexed leaflets; petals white, hardly notched, with recurved tip inside notch; fruit short-cylindrical, 6 mm long and 1.5 mm wide; stylopodium flat; styles short, divergent; ribs thickly filiform. July. (Plate VII, Figure 1.)

Limestone taluses in alpine zone, 2,700–3,000 m. – Caucasus: E. Transc. (Kyapaz Mountain). Endemic. Described from Kyapaz Mountain. Type in Leningrad.

Series 4. *Rosea Schischk.* – Low alpine perennials; leaf lobes of the last order linear; petals pink or reddish.

6. *C. roseum* M. B. Fl. taur.-cauc. I (1808) 234, var. β et γ inclus.; Ldb. Fl. Ross. II, 352; Boiss. Fl. or. II, 906; Shmal'g., Fl. I, 424; Grossg., Fl. Kavk. III, 125. – *Ch. tenuifolium* Stev. in Hoffm. Gen. Umbell. ed. 1 (1814) 180, ed. 2 (1816) 212, non Poir. (1816). – *Ch. brachycarpum* M. B. in Hoffm. Umbell. II (1816) 212; M. B. Fl. taur.-cauc. Suppl. (1819) 239. – *Ch. millefolium* DC. Prodr. IV (1830) 226; Ldb. Fl. Ross. II, 352; Boiss. Fl. or. II, 907; Grossg., Fl. Kavk. III, 125. – *Myrrhis rosea* Spreng. in Schult. Syst. veg. VI (1820) 519. – *M. millefolia* Spreng. l. c. (1820). – *Sphallerocarpus millefolius* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXIX (1916) 202. – *Chaerophyllum roseum* var. *millefolium* Schmalh. Fl. I (1895) 424; Kozo-Pol. in Bot. mat. Gerb. 103 Gl. Bot. Sada RSFSR, IV (1923) 173. – Ic.: Gartenfl. XXVI, tab. 915 (1877).

Perennial; root vertical or ascending, 0.3–1 cm thick; stem erect or slightly curved at nodes, slightly branching above or sometimes from middle, rarely simple, 20–70 cm high, entirely glabrous or covered with spreading or retrorse hairs below; petioles of radical and lower cauline leaves longer than blades, the latter ovate or oblong-ovate, 3–9 cm long, 2–5 cm wide, glabrous or with short rigid hairs, tripinnatisect; primary and secondary lobes on short petiolules, sometimes subsessile, lobes of the last order linear or oblong-linear, sometimes narrowly linear or sub-filiform (var. *millefolium* (DC.) Schmalh.), acute or obtuse, 2–5 mm long, ca. 0.5 mm wide; petioles broadened to oblong, glabrous or ciliate sheath with narrow scarious margin; upper leaves smaller, sessile on sheath. Umbels of 7–11 smooth rays crowded in fruit; involucre 0 or with 1 (or 2) ovate, apically linear, 1–1.5 cm long, villous-hairy, usually reflexed, rarely erect leaflets; involucels 5–6-leaved, one-sided; outer leaflets (2–3) attenuate, ovate at base, irregular, margin with soft, long hairs, $1\frac{1}{2}$ to 2 times as long as umbels, rarely equal; inner leaflets ovate, much shorter than pedicels; petals pale or saturated pink, very rarely white (var. *albiflorum* Schischk.), elongating, 2-lobed to middle; fruit linear-oblong, 4.5–7 mm long, ca. 2 mm wide; stylopodium short-conical; styles longer than stylopodium, later recurved. July.

Alpine and subalpine meadows, mountain slopes. – Caucasus: Cisc., Dag., W. and E. Transc. Endemic. Described from Georgia. Type in Leningrad.

Note. *C. roseum* is extremely variable in all characters. The leaf lobes of the last order are oblong or linear, sometimes subfiliform; the stems and petioles are profusely pubescent with spreading or retrorse hairs, glabrous or subglabrous; the petals are pink, pink-purple, rarely white; the involucre is usually obsolete or 1-5 leaflets similar to those of the involucels. It grows mainly along the Main Range very rarely in the Lesser Caucasus or W. Transcaucasia. Most authors recognize two species which in the absence of other characters depend on the nature of the leaf lobe: *C. millefolium* DC. and *C. roseum* M.B. (DeCandolle, Ledebour, Boissier, Grossgeim). But the dissection of the leaves seems to
104 depend on ecological factors. Plants with thin lobules (i.e., *C. millefolium* DC.) do in fact occur throughout the distribution area of the species. With Shmal'gauzen and Kozo-Polyanskii we recognize a single species, *C. roseum* M.B.

7. *C. rubellum* Alb. Prodr. Fl. Colch. (1895) 105; Grossg., Fl. Kavk. III, 125. — *C. rubellum* var. *colchicum* Lipsky in Tr. Bot. Sada, XIV (1895) 274. — *C. roseum* var. *rubellum* K.-Pol in Bot. mat. Gerb. Gl. Bot. Sada RSFSR, IV (1923) 173. — Exs.: Herb. Fl. Cauc. No. 88.

Perennial; stem 25-60 cm high, branching from base, glabrous or in lower part sparingly pubescent like the leaves; radical and lower cauline leaves long-petioled, ovate, bipinnatisect, primary lobes petioluled, ovate, secondary lobes ovate, acute, acutely or obtusely toothed; 2-6 mm long, 1.5-2 mm wide; median cauline leaves short-petioled, petiole inflated to sheath — dissected into longer and narrower lobules; upper leaves sessile on sheath, dissected into linear lobules. Umbels of 5-11 smooth rays 2-5 cm across; involucre 0 or of 1-6 linear irregular leaflets; involucels multifoliate, leaflets lanceolate and lanceolate-subulate, villous-hairy, shorter than umbels; petals intensively purple-red, glabrous, 1.5 mm long; petals linear-oblong, 6.5-7.5 mm long; stylopodium short-conical; styles as long as or longer than stylopodium, erect at first, becoming recurved. June-August, Fr. September. (Plate VII, Figure 2.)

Alpine and subalpine meadows, 2,800 m. — Caucasus: Cisc. (W.), W. Transc. Endemic. Described from NW Caucasus. Type in Geneva, cotype in Leningrad.

Series 5. *Involucrata* Schischk. — Perennials; petals white; leaflets of involucels ovate, longer or shorter than umbels.

8. *C. astrantiae* Boiss. et Bal. in Boiss. Fl. or. II (1872) 906; Grossg., Fl. Kavk. III, 127.

Perennial; root vertical or ascending, 4-7 mm thick; stems solitary or few, upright, erect or slightly curved, 15-50 cm high, glabrous, rarely covered in lower part with retrorse stiff hairs, simple or with 1 branch above; radical and lower cauline leaves long-petioled, dilated to oblong
107 sheath, the blades triangular-oblong, 3 to 4 times pinnatisect, glabrous or with short stiff hairs, with narrowly linear or subfiliform acute lobes of the last order, 3-10 mm long, 0.2-0.4 mm wide; upper leaves smaller, sessile on elongated sheath. Umbels of 11-15, glabrous, slightly irregular

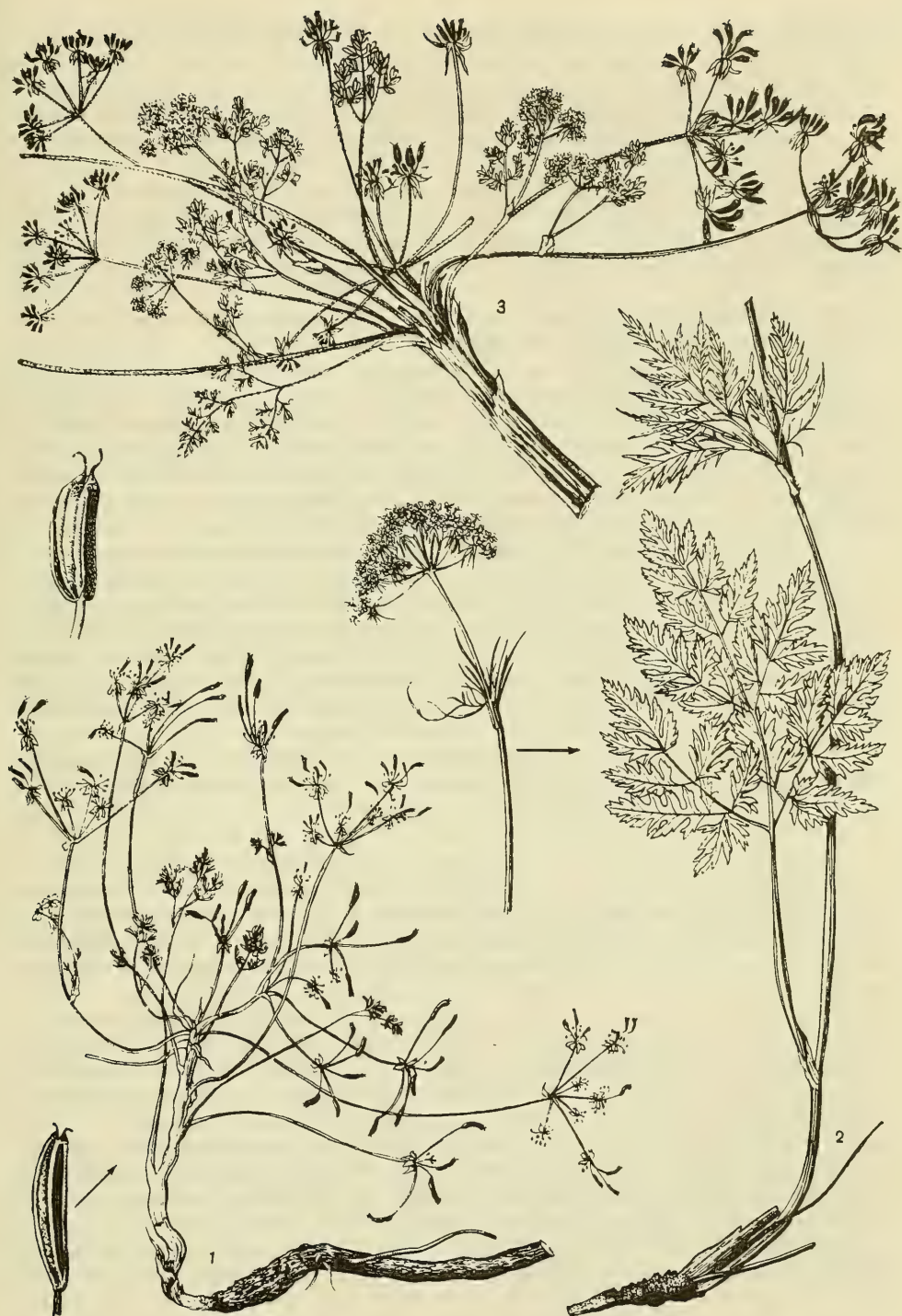


PLATE VII. 1 - *Chaerophyllum kiapazi* Woron; 2 - *Ch. rubellum* Alb.; 3 - *Ch. humile* Stev.

rays, 2.5–5 cm across; involucre 0 or of 1–2 oblong-ovate scarious leaflets with ciliate margin, half as long as umbel rays; involucels of 6–7 ovate or broadly ovate leaflets, scarious but for the midrib, with villous-ciliate margin, as long as umbels, apex short-acuminate or tapering abruptly into more or less long subulate tip; petals rounded, 4–5 mm long; stylopodium short-conical. July–August.

Subalpine and alpine meadows, thickets of Caucasian rhododendrons, rarely in rocks. – Caucasus: W. Transc. (Adzhar-Imeretian Range, Karchkal Mountain, Sanislo Range, Trial Mountain). Gen. distr.: As. Min. (Pontus Range). Described from Pontus Range (Dzhimil). Type in Geneva.

9. *C. borodinii* Alb. in Bull. Herb. Boiss. II (1894) 451; Prodr. Fl. Colch. (1895) 106; Grossg., Fl. Kavk. III, 126.

Perennial; rhizome vertical or ascending; stems few, ascending at base, geniculately bent at nodes, 20–50 cm high, branching from base, stems and leaves glabrous, sheaths foliate, with softly ciliate margin; radical and lower cauline leaves commonly long-petioled, abruptly passing into oval sheath with scarious margins, leaves ovate-oblong, thrice pinnatisect, lobes of the last order narrowly linear, 2–5 mm long, 0.2–0.5 mm wide; upper leaves sessile on sheath, with slightly filiform lobes. Umbels in flower 1.5–3 cm across, of 3–4(5), irregularly glabrous rays; involucre 0 or of 1 ovate, early deciduous leaflet with ciliate-scarious margin; leaflets of involucels ovate-lanceolate, with broadly scarious villous margin, becoming recurved below; umbels with sterile and (1–4) fertile flowers; fruit linear-oblong, 8–11 mm long, ca. 2 mm wide; ribs thickish, regular; stylopodium short-conical; styles several times as long as stylopodium, usually recurved; mericarps concave inside; carpophore splitting into 2 above. Fl. July, Fr. August–September. (Plate VI, Figure 1.)

Taluses and limestone rocks, 2,100–2,400 m. – Caucasus: W. Transc. (Bzyb Range, Gagry Range, etc.). Endemic. Described from Fisht Mountain. Type in Geneva, cotype in Leningrad.

108 10. *C. khorossanicum* Czernjak. sp. nova in Addenda XV, 424.

Perennial; root thick, ca. 1 cm, vertical; stems few, erect or ascending, 30–80 cm high, branching from base, densely covered with short hairs below with longer retrorse bristles, scattered-hairy above or subglabrous; radical leaves long-petioled, broadened at base to oblong sheath, triangular-ovate, 7–12 cm long, 2–6 cm wide, thrice pinnatisect, primary lobes petioluled, the secondary sessile, pinnatisect into short pinnatifid lobules, densely covered with gray hairs; cauline leaves few, similar to radical, but smaller. Umbels with beard of hairs at base, the 3–5 rays irregular, scattered-hairy; involucre 0; umbels 15-flowered, with fertile and sterile flowers; involucels of 5–7 ovate, acuminate, short-hairy leaflets, with scarious margin; shorter than umbels; petals white, notched, with inward curved tip, hairy outside; fruit cylindrical, 9–11 mm long, ca. 1 mm across; ribs thickly filiform; stylopodium conical; styles straight, divergent, twice as long as stylopodium. May–June.

Mountain slopes, 2,300 m. – Centr. Asia: Mtn. Turkm. Gen. distr.: Iran. Described from Iran (Khorasad). Type in Leningrad.

Series 7. *Temula* Schischk. — Annuals or biennials with hairy umbel rays.

11. *C. temulum* L. Sp. pl. (1753) 258; Ldb. Fl. Ross. II, 351; Boiss. Fl. or. II, 903; Schmal'g., Fl. I, 423; Grossg., Fl. Kavk. III, 125. — *Ch. aureum* L. Mant. II (1767) 356, non L. (1753). — *Ch. temulantum* L. Fl. suec. (1755) 94. — *Ch. geniculatum* Gilib. Fl. lithuan. II (1782) 29. — *Scandix temula* Roth, Tent. Fl. Germ. I (1788) 1222. — *S. nutans* Moench, Meth. (1794) 101. — *Myrrhis temula* All. Fl. Pedem. II (1772) 29; Spreng. Umbell. Prodr. (1813) 29. — *Polgidon temulum* Raf. Good Book (1840) 53. — *Bellia temulenta* Bubani, Fl. Pyren. II (1900) 412. — *Selinum temulum* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 63. — Ic.: Syreishch., Fl. Mosk. gub. II (1907) 425. — Exs.: G. R. F. No. 216.

Annual or biennial; root fusiform, whitish; stem 40–80 cm high, erect, cylindrical, slightly furrowed when dry, somewhat inflated at nodes, usually with violet or dirty-reddish spots, rather long retrorse stiff hairs below, shortly and thinly appressed-bristly above, with spreading soft hairs; leaves 2 or 3 times pinnatifid, the lowermost petioled, the upper sessile on 109 dilated sheaths and less dissected, covered with short hairs; lobes of first order ovate or ovate-oblong, obtuse; lobes of last order broadly ovate, obtuse, slightly crenate, with short mucro. Umbels long-pediceled, of 6–12 scabrous bristly rays; involucre 0 or 1–2-leaved; involucels of 5–8 broadly lanceolate acuminate leaflets, with narrow scarious ciliate margin, slightly connate, sometimes leaflets 2-lobed; flowers polygamous; petals white, rarely reddish or yellowish, 2-lobed up to middle, the outer petals larger; fruit oblong, 5–7 mm long, ca. 1.5 mm across, ripe fruit yellowish; pedicels half the length of the fruit, thickish; styles divergent, nearly as long as conical stylopodium; carpophore split into two for short distance.

Light forests and groves, shrubby formations, river banks and streams, weedy habitats. — European part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., Balt., U. Dnp., M. Dnp., V.-Kama, U. Dns., Bes., Bl., L. Don, Crim.; Caucasus: Cisc., W. Transc., Tal. Gen. distr.: Centr. Eur. to S. Sweden, Balkans. Described from Europe. Type in London.

Economic importance. A poisonous plant, containing khellin, a poison to which horses are the most sensitive, cattle and swine less so. Mixed with parsley it may seriously harm even a healthy man.

Subgenus 2. *Golenkinianthe* (K.-Pol.) Schischk. comb. nov. — *Golenkinianthe* K.-Pol. in Tr. Yur'ev. Bot. Sada, XV (1914) 107, gen. — Perennials without tubers; only central flower of umbel fertile.

12. *C. macrospermum* (Willd.) Fisch. et Mey. ex Hohen. in Bull. Soc. Nat. Mosc. XI (1838) 327; Ldb. Fl. Ross. II, 351; Boiss. Fl. or. II, 905. — *Ch. gilanicum* Grossh. Fl. Kavk. III (1932) 126, non Stapf et Wettst. in Denkschr. Acad. Wien, LXI (1886) 54. — *Scandix gilanica* S. G. Gmel. Reise durch Russland, III (1774) 304. — *S. macrosperma* Willd. ex Schult. Syst. VI (1820) 507. — *Myrrhis gilanica* Schult. Syst. VI (1820) 520. — *M. clavata* Spreng. Syst. veg. I (1825) 903. — *Grammosciadium meoides* DC. Coll. Mem. V (1829) 63; DC. Prodr. IV;

233. — *Golenkinianthe macrosperma* K.-Pol. in Russk. Bot. Zhurn. (1915) 14. — *G. gilanica* K.-Pol. in Fl. Az. Ross XV (1920) 43. — Ic.: Gmel. 1.c. tab. XXI, f. 2. — Exs.: P. Sintenis, Iter transcasp.-pers. 1900–1901, No. 722.

110 Perennial; stem 80–100 cm tall, bearing obliquely antrorse branches nearly from base with stiff retrorse hairs below, glabrous above; radical leaves broadly ovate, ca. 40 cm long, 25 cm wide, 3 times pinnatisect, with oblong or ovate pinnatifid or dentate lobules covered with whitish spreading bristles, the petioles passing into long oblong sheath with scarious margins; cauline leaves similar but smaller. Umbels in flower 1.2–2 cm across, of 5–10 ribbed glabrous rays; involucre 0; involucels of 7–8 ovate-lanceolate acute leaflets with scarious short-ciliate margin, becoming recurved; central flower of umbel bisexual, on short, subsequently thickening pedicel, remaining 7–8 flowers sterile (staminate); petals white, hardly notched; fruit cylindrical, with thick filiform ribs, 15–17 mm long, ca. 2 mm thick; stylopodium short-conical; styles long, erect, becoming recurved. July.

Herbaceous mountain slopes, 1,500–1,600 m, and along banks of mountain streams. — Caucasus: S. Transc. (Karabakh, Nakhichevan ASSR, etc.); Centr. Asia: Mtn. Turkm. (Kopet Dagh, Masinev). Gen. distr.: Arm.-Kurd., Iran. Described from Armenia. Type (was) in Berlin.

Subgenus 3. *Buniomorpha* K.-Pol. in Bull. Soc. Nat. Mosc. XXIX (1915) 142. — Plants with tuberiform underground part, cotyledons crescent into long tube. Most flowers produce fruit. Biennials.

Series 1. *Angelicifolia* K.-Pol. 1.c. (1923). — Lower and median leaves biternate or pinnatifid dentate.

13. *G. angelicifolium* M.B. Fl. taur.-cauc. III (1819) 240; DC. Prodr. IV, 227; Ldb. Fl. Ross. II, 353; Grossg., Fl. Kavk. III, 126. — *Ch. lasio-laenum* Boiss. et Bal. ex Boiss. Fl. or. II (1872) 903. — *Ch. ortostylum* Trautv. in Tr. Bot. Sada, III, 2 (1875) 273. — *Ch. silvicola* Lipsky in Tr. Bot. Sada XIV (1898) 273, var. *minor* Lipsky incl. — *Myrrhis angelicaefolia* Schult. Syst. veg. VI (1820) 509. — Exs.: Pl. cauc. exs. No. 40.

111 Biennial; root tuberiform; stem 40–60(80) cm high branching, glabrous, slightly inflated below nodes, the lower part covered with stiff retrorse hairs, the upper with horizontally spreading hairs; lower leaves triangular, 2 to 3 times pinnatisect, on long spreading-ciliate or glabrous petioles dilated into amplexicaul sheath; lobes of the last order large, ovate-oblong or ovate, 2–7 cm long, 1–3 cm wide, petioluled, dentate-serrate, truncate or rounded or cuneate at base; lobes of upper leaves smaller, sublinear; uppermost leaves sometimes dissected into long linear lobes. Umbels of 10–15 thin divergent glabrous rays, 3–4 cm long; involucre 0; involucels of 5–7 lanceolate leaflets, long-attenuate, 5–7 mm long, white-scarious leaflets with ciliate margin, becoming reflexed; petals white (the peripheral ones slightly elongate to 1.5 mm); fruit elongate-ovate or sublinear, 5–7 mm long, ca. 1 mm wide; carpophore splitting at

tip; stylopodium yellowish, conical; styles usually twice as long as stylopodium, erect, somewhat divergent. May–July. (Plate VI, Figure 3.)

Beech, wingnut and hornbeam forests, shrubby thickets to 1,800 m. – Caucasus: W. and E. Transc. Gen. distr.: As. Min. (Pontus Range). Described from Georgia. Type in Leningrad.

14. *C. meyeri* Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 103; Boiss. Fl. or. II, 902; Grossg., Fl. Kavk. III, 124. – Ch. angelicaefolium C. A. M. Verzeichn. Pfl. Cauc. (1831) 130, non M. B.

Biennial; root tuberiform; stems 20–60 cm high, thin, few-branched, slightly inflated below nodes, entire plant, especially petioles, covered with spreading hairs; lower and median leaves on petioles shorter than blades, thrice pinnatisect with primary and secondary lobes on petiolules, the latter ovate or broadly ovate, obtuse, incised-dentate, 2–4.5 cm long, 1.5–3.5 cm wide. Umbels of 9–17 smooth thin rays; involucre 0 or of 1 linear-oblong leaflet; leaflets of involucels ovate, with long mucro, glabrous with membranous margin, becoming reflexed, shorter than pedicels; petals white, deeply notched, the peripheral slightly elongate to 2 mm long; fruit cylindrical, 8–9 mm long, with filiform ribs; stylopodium short-conical; styles straight, divergent, 2 to 3 times as long as stylopodium. May–June.

Mountain forests, 900–1,200 m. – Caucasus: Tal. Gen. distr.: Iran. Described from Talysh. Type in Leningrad.

15. *C. confusum* Woron. ex Grossg., Fl. Kavk. III (1932) 124 and in Tr. Bot. Inst. AN SSSR, ser. 1, ed. 1 (1933) 218.

Biennial; stems 30–80 cm high, branching from base, covered below with appressed retrorse bristles, glabrous above, leaves twice pinnatisect, primary lobes ovate, acute, auriculate broadened on outer side or more or less deeply and irregularly 2-lobed, incised-dentate; petioles and dilated sheath bristly along margins. Umbels 3–6 cm across, of 10–15 thin, 112 smooth rays; involucre 0; involucels of 5–7 lanceolate leaflets, with broadly membranous long-dissected margins and thin, distinctly acuminate apex; petals red, notched for $\frac{1}{3}$ to $\frac{1}{2}$, with short tip curved inwards; fruit cylindrical, 5 mm long, ca. 1 mm wide, with thickly filiform ribs; stylopodium short-conical; styles as long as or slightly longer than stylopodium, divergent. June–July. (Plate VI, Figure 2.)

Subalpine meadows, 1,600–2,700 m. – Caucasus: Main Range, W. Transc. (Adzhar-Imeretian Range). Endemic. Described from alpine meadows (Biyuk-pikal'). Type in Leningrad.

Note. Fruiting specimens of this species are easily confused with *C. angelicifolium* M. B. In fruit *C. confusum* Woron. can be distinguished from *C. angelicifolium* as follows: the latter species bears 1–6 fruits per umbel, as many flowers do not bear fruit, while in the former species all, or nearly all (20–30) flowers are fertile. Also in *C. confusum* the styles are as long as or slightly longer than the stylopodium; in *C. angelicifolium* they are twice as long.

16. *C. temuloides* Boiss. in Ann. Sc. Nat. sér. III, II (1844) 64; Boiss. Fl. or. II, 903; Grossg., Fl. Kavk. III, 127.

Biennial; root tuberiform; stem solitary, 30–40 cm high, erect, simple, covered below with retrorse stiff hairs, glabrous above; radical and lower

cauline leaves with long-petiole, passing into oblong sheath bearing thin bristly hairs; blades triangular, twice-thrice pinnatisect with primary lobes on petiolules with short stiff hairs, lobes of the last order oblong or ovate, incised-bidentate; upper leaves smaller and less dissected, sessile on short sheath. Umbels ca. 5 cm across, of 10 glabrous irregular rays; involucre 0; leaflets of involucels 5-7, ovate-lanceolate, with scarious, ciliate margins; petals white, 2-lobed for nearly half their length, with short tip curved inwards; fruit linear-oblong or linear; stylopodium short-conical; styles recurved, twice as long as stylopodium. June.

Reported for the Caucasus: E. Transc. Gen. distr.: Iran (N.), Arm.-Kurd. Described from N. Iran. Type in Geneva.

Series 2. *Crinita* Schischk. — Peripheral petals much elongated (to 4 mm); leaflets of involucels covered with soft hairs.

17. *C. crinitum* Boiss. in Ann. Sc. Nat. sér. III, II (1844) 63; Boiss. Fl. or. II, 904; Grossg., Fl. Kavk. III, 127.

- 113 Biennial; root globular-tuberiform; stem 25-50 cm high, erect, branching in upper half, sometimes slightly curved at nodes, densely covered in lower part with retrorse hairs, glabrous or with scattered long hairs above; radical and lower cauline leaves early withering, their more or less long petioles passing into an oblong-elongate, pubescent or glabrous sheath with scarious margins; blades triangular-ovate, thrice pinnatisect, covered with stiff hairs; lobes of the last order linear, 2-5 mm long. 0.4-0.7 mm wide, acute; median and upper leaves sessile on elongated sheath, 4-8 cm long, 3-5 cm wide; uppermost leaves smaller, with narrower and longer lobules. Umbels 3-9 cm across, of 7-12 smooth rays, these spreading in flower, clustered in fruit; involucre 0 or of 1 oblong leaflet with scarious margin; involucels 5-7-leaved, leaflets with scarious margins or nearly scarious throughout, ovate or broadly ovate, soft-hairy, abruptly tapering into subulate mucro, as long as umbels, appressed to rays at beginning of anthesis, becoming reflexed; petals white, the peripheral much elongated (to 4 mm), deeply 2-lobed; fruit cylindrical, to 10 mm long, ca. 1 mm thick; stylopodium short-conical; styles erect, slightly longer than stylopodium, becoming divergent. May-June.

Stony and herbaceous slopes and taluses, to 1,500 m. — Caucasus: S. Transc. Gen. distr.: As. Min., Iran. Described from Savalan Range in Iran, and from Cappadocia. Type in Geneva.

Series 3. *Bulbosa* K.-Pol. l.c. (1923). — Peripheral petals not elongated or slightly elongated (to 2 mm); leaflets of involucels glabrous, rarely with few obscure bristles.

18. *C. bulbosum* L. Sp. pl. (1753) 370; Ldb. Fl. Ross. II, 356; Schmal'g., Fl. I, 423; K.-Pol. in Fl. Az. Ross. 41; Kryl., Fl. Zap. Sib. VIII, 2029. — *Ch. rapaceum* Alef. Landw. Flora (1866) 163. — *Ch. neglectum* Zing. in Bull. Soc. Nat. Mosc. LVI, II (1881) 312. — *Ch. bulbosum* var. *typicum* Lindem. Fl. Cherson. I (1881) 263. — *Ch. bulbosum*

var. normale Kuntze in Tr. Bot. Sada, X (1887) 191. — *Scandix bulbosa* Roth, Tent. Fl. Germ. I (1778) 123. — *Myrrhis tuberosa* Jundz. Opis. rosl. Litew. (1791) 118. — *M. bulbosa* Spreng. Umbell. Prodr. (1813) 29, nec All. — *Polgidon bulbosum* Raf. Good Book (1840) 53. — *Selinum bulbosum* E. H. L. Krause in Sturm, Fl. Deutchl. ed. 2, XII (1904) 62. — Ic.: Syreishch., Fl. Mosk. gub. II, 425; Rchb. Ic. Fl. Germ. XXI, tab. 2017. — Exs.: G. R. F. No. 1113.

- 114 Perennial; stem erect, 30–180 cm high, branching, hollow inside, ovoid or subglobular, with tuberiform thickening at base, covered with long white retrorse bristles and bearing violet spots below, glabrous in upper part, often more or less inflated below nodes; leaves broadly triangular, the lower on long (10–20 cm) hairy petioles, tripinnate, with pinnatipartite terminal lobes; blades bright green, 15–30 cm long and nearly as wide, often covered below, mostly along nerves, with sparse long hairs; upper leaves subsessile, with long sheaths and narrow linear-oblong or linear leaflets, 2–10 mm long, 1–2 mm wide. Umbels 3–7 cm across, of 8–15(20) irregular glabrous rays; involucre 0; leaflets of involuclers usually one-sided, of 3–5 acuminate, linear-lanceolate or lanceolate, irregular leaflets, the scarious margin glabrous or furnished with sparse bristles; petals white, glabrous, very rarely hairy outside along midrib, rounded-obovate, 2-lobed nearly up to middle, tapering abruptly at base, the peripheral petals not elongated; fruit linear-oblong, 4–6 mm long, 1.5–2 mm wide, with broad, nearly flat stylopodium, the divergent styles usually recurved below, as long as stylopodium. June–July.

Shrubby formations, forest edges, fallow lands, cereal crops. — European part: Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., L. V. (rarely), L. Don (N.), Bl., Crim., Bes., U. Dns.; Caucasus: Cisc.; Centr. Asia: Ar.-Casp. (Uil River). Gen. distr.: Centr. Eur. (N. Balkans, introduced into N. Am.). Described from Alsace, Hungary, Switzerland. Type in London.

Economic importance. The roots of this species contain from 12 to 25% nitrogen-free extractable substances (including 19.81% starch and 1.8% sugar), 2.6–4.6% nitrogenous substances, 0.2–0.4% fat, 66% water and 1.5% ash. The roots are eaten boiled, or fried in butter, and are sometimes added to soups.

19. *C. caucasicum* (Fisch.) Schischk. comb. n. — *Ch. bulbosum caucasicum* Fisch. Cat. Hort. Gorenk. ed. 1 (1809) 45 nom. nud. — *Ch. bulbosum* var. *caucasicum* Hoffm. Gen. Umb. ed. 1 (1814) 35. — *Ch. bulbosum* var. *brachycarpum* Lipsky in Tr. Bot. Sada. XIV (1898) 272. — *Ch. bulbosum* Boiss. Fl. or. II, 904, quoad pl. cauc. pro max. parte; Grossg., Fl. Kavk. III, 124, pro max. parte.

- Biennial; root tuberiform, thickened, ovoid or broadly ovoid; stem solitary, branching from middle, densely covered in lower half with spreading and retrorse stiff white bristles, glabrous in upper part, 50–150 cm high; 115 lower leaves early withering, triangularly and broadly ovate, their petioles abruptly broadening into an amplexicaul glabrous sheath with scarious margin, $\frac{1}{3}$ the length of the blades, these 15 cm long and nearly as wide, thrice pinnatisect; primary and secondary lobes on bristly-hairy petiolules, with bristles beneath along midrib, lobes of the last order sessile or on very short petiolules, ovate, incised into obtuse oblong-ovate

teeth; median cauline leaves sessile on broadened sheath, the upper with reduced sheaths and abortive blade, divided into linear lobes. Umbels 5–6 cm across, of 9–11 glabrous irregular rays; involucre 0; umbellets 1–1.5 cm across, with irregular pedicels; involucels of 3–5 ovate-lanceolate, acuminate leaflets with broadly scarious margins, sometimes purple, glabrous or with few cilia, becoming reflexed; calyx-teeth inconspicuous; petals white, the peripheral elongated to 2 mm, broadly ovate, with rounded apex; fruit cylindrical, 4–5 mm long, 1–1.5 mm across; stylopodium short-conical; styles recurved below, slightly longer than stylopodium; ribs pale yellow-green; vallecule narrow, dark orange. May–June.

Stony and herbaceous slopes, gardens, 900–1,600 m. – Caucasus: Cisc., Dag., E., W. (Novorossiisk vicinity) and S. Transc. Gen. distr.: Iran. Described from the Caucasus. Type in Leningrad.

Economic importance. Used as food, like the preceding species. Chemical composition not studied.

20. *C. bobrovii* Schischk. sp. nov. in Addenda XV, 425.

Perennial; tuber globose or oblong-globose, 1–1.5 cm in diameter; stem solitary, ca. 40–60 cm high, erect, cylindrical, densely covered below with retrorse white 2 mm long bristles, slightly branching; radical and lower cauline leaves early withering, their long petioles gradually passing into oblong-lanceolate sheath; median cauline leaves with tripinnate blades, on short petioles abruptly passing into dilated sheath; primary lobes petioluled, secondary lobes on short petiolules or subsessile, deeply pinnatifid into ovate lobules 7–10 mm long, 3–5 mm wide; upper leaves ternate-compound, sessile on short dilated sheath, terminal lobes ovate or oblong, 0.5–1.5 cm long, 2–5 mm wide, obtuse. Terminal umbels unknown, lateral umbels of 5–7 glabrous irregular rays; involucre 0; umbellets 8–10-
116 flowered, withering, often only 1–4 flowers in umbellet fertile; involucels of 5 straight lanceolate-linear glabrous leaflets with narrow scarious margins; petals white, ca. 1 mm long; fruit oblong-cylindrical, 5 mm long, 1–1.5 mm wide; stylopodium short-conical; styles longer than stylopodium, recurved, spreading; mericarps with 5 thick ribs and dark-colored vallecule. June.

In *Juglans regia* forest, 1,760 m. – Centr. Asia: Mtn. Turkm. (SE of Kopet Dag). Endemic. Described from Por-dere Gorge. Type in Leningrad.

Note. A very distinct species, unfortunately represented by only a few specimens, with stems gnawed off. The recurved styles are reminiscent of *C. bulbosum* L. and *C. caucasicum* (Fisch.) Schischk., from which it differs sharply by the wide leaf lobes and few fertile flowers per umbel. From *C. meyeri* it is clearly distinguished by the recurved styles.

21. *C. prescottii* DC. Prodr. IV (1830) 225; Fisch., Mey et Lall. in Ind. sem. Hort. Petrop. IX (1843) 66; Ldb. Fl. Ross. II, 350; Shmal'g., Fl. I, 424; K.-Pol. in Fl. Az. Ross. XV, 40; Grossg., Fl. Kavk. III, 124; Kryl., Fl. Zap. Sib. VIII, 2028. – *C. bulbosum* Ldb. Fl. alt. I, 360, non L. – *C. rapaceum prescottii* Alef. Landw. Fl. (1866) 163. – *C. bulbosum* var. *prescottii* Lindem. Fl. Cherson. I (1881) 263. –

Ch. bulbosum var. *hirsutissimum* Kuntze in Tr. Bot. Sada, X (1887) 191. — *Anthriscus prescottii* Veesenm. in Beitr. zur Pflanzk. d. Russ. Reich. IX (1854) 84. — Ic.: Fl. Yugo-Vost. Evrop. ch. SSSR, V, Fig. 509. — Exs.: G. R. F. No. 215; Fellman, Pl. arct. exs. No. 116.

Biennial with tuberous root, recalling carrots in taste; stem 50–180 cm high, furrowed, red-speckled, more brightly so in lower part, covered with white recurved bristly hairs below, with sparse hairs or glabrous above; lower leaves tripinnate, triangular, their long petioles covered with soft or setiform hairs; blades 10–25 cm long and as wide, tripinnate; primary, secondary and some tertiary lobes petioluled; tertiary lobes deeply pinnatisect into lanceolate lobules; upper leaves smaller, less compound-dissected, sessile on dilated sheaths with linear or subfiliform lobules. Umbels 3–8 cm across, of 12–20 glabrous rays; involucre 0; involucels of 5–10 glabrous lanceolate or ovate leaflets tapering into mucro; petals white, all regular or the peripheral slightly enlarged; fruit linear-oblong, 6–9 mm long, 1–1.5 mm thick; stylopodium conical; styles straight, slightly divergent. Fl. June–July, Fr. August.

Shrubs, herbaceous slopes, forest edges, as a weed at edges of fields, 117 among winter and spring crops, along railroad beds. — Arctic: Arc. Eur.; European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm. (rare), V.-Kama, U. V., V.-Don, M. Dnp., Bl., L. Don, Transv., L. V.; Caucasus: Cisc. (very rare); W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say. (Minusinsk District); Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Mong., Dzu.-Kash. Described from Altai. Type in Geneva.

Economic importance. The roots of this species contain up to 17.3% starch. The young stems and roots are eaten raw, after removal of the skin; leaves and young stems are added to cabbage soup and salads. *C. prescottii* is a common weed of spring and winter crops, especially rye and millet. Its seeds are scattered with those of the crop, from which they are not readily separated, as the mericarps of *Chaerophyllum* are similar in length to the seeds of some crops (e.g., rye). Careful cleaning of seeds and regular weeding out will provide effective control.

Undescribed species.

Chaerophyllum biebersteinii Lag. ex Sweet (Hort. Brit. ed. 1 (1822) 190) is known only by name.

Genus 948. **KRASNOVIA** * M. Pop.

M. Pop. in Addenda XV, 591

Flowers bisexual; calyx-teeth inconspicuous; petals white, the peripheral slightly elongate, notched lobule in notch curved inward; fruit ovoid-oblong, abruptly tapering, shiny, mericarps obtusely pentagonal in cross section, with 5 protruding main ribs (crenulate in young fruits), valliculae broad with 1 canal, black on the outside, shiny, slightly tuberculate; stylopodium flat-conical; styles recurved below, 3 times as long as stylopodium. Perennial herbs, with tubers buried in ground, stem slightly stiff-hairy; leaves 2–3 times pinnatisect.

* Named in honor of the noted botanist and geographer, Prof. A. N. Krasnov (1862–1914).

Monotypic genus, Tarbagatai Range, Dzungarian Ala-Tau, Tien Shan and adjacent mountains in Sinkiang.

- 118 1. *K. longiloba* (Kar. et Kir.) M. Pop., Fl. Almaat. zapov. (1940) 34, nom. — *Sphallerocarpus longilobus* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 432. — *Chaerophyllum sphallerocarpum* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 307; Ldb. Fl. Ross. II, 350. — *Ch. longilobum* B. Fedtsch. in O. and B. Fedchenko, Perech. rast. Turkest. III (1909) 20. — *Conopodium longilobum* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 206.

Perennial; tuber globular, 1.5 cm across, usually buried; stem solitary, 50–70 cm high, branching or simple above, angularly ribbed, covered with rather long, soft, retrorse, straight hairs, rarely subglabrous; radical and lower cauline leaves early withering, rather long-petioled, gradually dilated to sheath, blades triangular, nearly tripinnatisect, 7–8 cm long, 4.5 cm wide; terminal lobes linear-oblong, 3–6 mm long, 0.5–1.6 mm wide, acute; cauline leaves smaller, sessile on dilated sheath. Umbels 3–4 cm across, of 5–8 smooth, irregular rays; involucre 0 or of 1–2 caducous leaflets; umbellets many-flowered, ca. 1 cm in cross section; involucre of 5 lanceolate or ovate-lanceolate, subentire, scarious leaflets with glabrous margin, erect, becoming reflexed; petals white, obovate, notched, lobule in notch curved inwards, marginal petals slightly elongated, to 1.5 mm; fruit ovoid-oblong, 3–4 mm long, ca. 1.5 mm across, tapering black, shiny, irregularly tuberculate, with protruding ribs; stylopodium flat-conical; styles recurved below, 3 times as long as stylopodium. May–June. (Plate XV, Figure 1.)

Turfy rocks and herbaceous slopes. — Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Sinkiang. Described from Tarbagatai Range (Dzhanbyk River). Type in Leningrad.

Genus 949. **SPHALLEROCARPUS** * Bess.

Bess. ex DC. Mém. Ombellif. (1829) 60; DC. Prodr. IV (1830) 230

- 119 Calyx teeth conspicuous, subulate; petals white, obovate-cuneate, notched with inward curved lobule, peripheral petals of umbellet elongated; fruit elliptic-oblong, slightly compressed laterally; stylopodium short-urceolate, dentate; styles short, recurved below; mericarps with 5 protruding flexuose ribs; valliculae with 2–3 canals, 4–6 canals at commissure; carpophore 2-partite, albumen at commissure notched. Biennial plants, with twice-pinnate leaves.

Monotypic genus, E. Siberia, the Far East, Mongolia and China.

1. *S. gracilis* (Bess.) K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 202; Litv. in Spiske rast. gerb. Russk. fl. VIII (1922) 124. — *S. cyminum* Bess. in DC. Mém. Ombell. (1829) 60; DC. Prodr. IV (1830) 230; Ldb. Fl. ross. II, 354; Turcz. Fl. baic.-dah. I, 511; Kom., Fl. Man'chzh. III, 157. — *Chaerophyllum cyminum* Fisch. in Catal. sem.

* From the Greek sphalleros — deceptive, carpon — fruit.

Horti Vratisl. a. 1821 (nom. nud.). — *Chaerophyllum gracile* Bess. ex Trevir. in Acta Acad. Carol. Nat. curios. XIII, 1 (1826) 172. — *Myrrhis gracilis* Spreng. Syst. veg. IV, 2 (1827) 120. — *Conopodium cyminum* Benth. et Hook. Gen. pl. I (1867) 896. — Ic.: DC. in Mém. Ombell. (1829), pl. II, f. N. — Exs.: G. R. F. No. 2648.

Biennial; root vertical, thin; stem 50–120 cm high, branching, cylindrical, finely ribbed, covered with spreading stiff hairs below, glabrous or subglabrous above; radical leaves early withering; cauline leaves densely covered with short spreading hairs, especially along nerves, with ciliate margin, the petioles $\frac{1}{4}$ the length of the blade, sheath broadly triangular, main petiole densely pubescent beneath, sparsely pubescent above; leaves in general broadly ovate, 3 or nearly 4 times pinnatisect; segments of the second order ovate-lanceolate, short-petioled, of the third order ovate, the lower dissected into linear-lanceolate acute lobes, sometimes with scattered stiff hairs along nerves. Umbels terminating stem and branches of 8–10 irregular glabrous rays; general involucre 0 or of 1–3 caducous, ovate leaflets with ciliate margin; umbellets of 15–25 rays; involucels of 5 reflexed broadly scarious leaflets with long-soft ciliate margin; petals white, 1.5 mm long, deeply notched; fruit ovoid, 5–6 mm long, ca. 3 mm wide, with 5 rather thick, protruding, flexuose ribs. Fl. July, Fr. August. (Plate XV, Figure 2.)

Kitchen gardens, around dwellings, roadsides, ravines, fences, crops and weedy places. — E. Siberia: Ang.-Say. (up to Krasnoyarsk in the west), Dau., Lena-Kol. (Yakutsk, Amga near Yakutsk); Far East: Ze.-Bu., Uss., Okh., Sakh. Gen. distr.: Mongolia, Jap.-Ch. Described from a plant grown in the Bratislava Botanical Garden from seeds obtained from Besser, but locality of seeds not indicated. Type in Geneva.

120 Genus 950. **GRAMMOSCIADIUM** * DC.

DC. Coll. Mém. V (1829) 62

Calyx-teeth subulate, hardening in fruit; petals white; fruit narrowly cylindrical, on thickened pedicels; mericarps with regular 5 protruding ribs; vallecule narrow, with 1 canal; albumen nearly flat. Perennial herbs, with twice pinnatisect leaves with thinly subulate terminal lobules and pinnatisect involucre.

Six species in the southern Transcaucasia, Turkish Armenia and Iran.

1. *G. daucooides* DC. Coll. Mém. V (1829) 62; DC. Prodr. IV, 233; Ldb. Fl. Ross. II, 355; Boiss. Fl. or. II, 899; Grossg., Fl. Kavk. III, 128. — *G. szovitsii* Boiss. in Ann. Sc. nat. sér. III, II (1844) 67. — *G. aucheri* Grossg., ibid III, 128, non Boiss. — *Prionitis daucooides* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 140. — *Falcaria daucooides* K.-Pol. l. c. (1915). — Ic.: DC. Mém. V (1829) tab. 2, f. K.; Koz.-Pol. in Russk. Bot. zhurn. 1–2 (1915) tabl. on p. 16, fig. 1–5 (fruit).

* From the Greek *gramma* — stripe, line, *scias* — umbrella, presumably referring to the linear-subulate lobes of the involucre.



PLATE VIII. 1 - *Grammosciadium daucooides* DC; 2 - *Caropodium armenum* (Bordz.) Schischk.

Perennial; entire plant glabrous; root vertical or ascending, 0.4–0.8 cm thick, root collar covered with dead leaves; stem erect, 30–50 cm high, cylindrical, thinly ribbed, branching from middle or sometimes nearly from base; radical leaves with petioles nearly as long or longer than blade passing into oblong sheath, with petioles 8–15 cm long, 1–2 cm wide, oblong-linear, twice pinnatisect, the terminal lobes thinly subulate, mucronate, 3–7 mm long; upper cauline leaves sessile, their lobes often longer, to 10–15 cm. Umbels 2.5–5 cm across, in fruit to 10 cm, of 5–9 smooth rays; involucre multifoliate, of pinnatisect leaflets with subulate lobes; umbellets ca. 1 cm across, with glabrous rays; involucels of 5–7 pinnate, ternate or entire leaflets, shorter than pedicels, reflexed; calyx-teeth subulate, ca. 0.5 mm long, persistent; petals white, to 1.5 mm long; fruit cylindrical, 9–10 mm long, ca. 1.5 mm across, with regular protruding ribs; pedicels thickened in fruit, $\frac{1}{2}$ – $\frac{1}{3}$ the length of the fruit. June. (Plate VIII, Figure 1, Plate XV, Figure 3.)

23 Southern slopes. — Caucasus: S. (?) and E. Transc. Gen. distr.: Arm.-Kurd. Described from Tournefort's collections from Armenia. Type in Geneva.

Genus 951. **CARPODIUM*** Stapf et Wettst.

Stapf et Wettst. Die botan. Ergebnisse d. Polak'schen Expedition nach Persien II (1886) 49. — Stenodiptera K.-Pol. in Trud. Bot. sada Yur'evsk. Univ. XV, 1 (1914) 21; Russkii Bot. zhurnal, Nos. 1–2 (1915) 12

Calyx-teeth conspicuous; petals white, obovate-cordate, with inward curved tip. Fruit oblong-linear, with filiform dorsal and winged lateral ribs; stylopodium short-conical, with crenate bordered margin; carpophore 2-fid; wings of mericarps tightly contiguous; canals solitary under valleculeae, 2 at commissure; fascicles of sclerenchymatous fibers along dorsal ribs and outside of vittas (under valleculeae); endosperm slightly concave. Perennial glabrous herbs, with linear-setiform leaf lobes.

Five species, in Transcaucasia, Near Asia and Iran.

- 1. Fruit 9–10 mm long; wings ca. 1 mm wide 1. *C. armenum* (Bordz.) Schischk.
- + Fruit 15–18 mm long, wings ca. 0.5 mm wide 2. *C. platycarpum* Boiss. et Hausskn.) Schischk.

1. *C. armenum* (Bordz.) Schischk. in Botan. Mater. gerb. Glavn. Bot. sada, IV (1923) 30; Grossg., Fl. Kavk. III (1932) 128. — Stenodiptera armena Bordz. in Zap. Kievsk. Obshch. Estestv. XXV, 1 (1915) 96. — S. haussknechtii K.-Pol. in Russk. Bot. zhurn. 1–2 (1915) 13; Vestn. Russkoi flory, II, 2 (1916) 97, non *Grammosciadium haussknechtii* Boiss. — *Grammosciadium armenum* Bordz. l.c. — Ic.: Bordzilovskii, op. cit. fig. 8, 1–9.

Perennial; entire plant glabrous; root collar covered with remnants of leaves; stem 30–40 cm tall, erect, thinly ribbed, branching above, leaves

* From the Greek karon — caraway, pous (genitive — podos) — foot.

- 124 linear-oblong, 5–6 cm long, 1–1.2 cm wide, sessile on sheaths, nearly thrice pinnatisect, lobes of the first order broadly ovate or rounded, lobules of the last order linear-setiform, with whitish mucro; upper leaves smaller and less compound. Umbels 4–6 cm across, of 7–12 smooth irregular rays; involucre of 3–5 entire pinnatisect or 3-partite leaflets with linear-subulate lobes; leaflets of involucels 2–3-partite or entire, setiform; calyx-teeth very conspicuous, elongating after flowering; petals white, obcordate, with inward curved tip, peripheral petals elongated to 4 mm, 2-lobed; fruiting pedicels thickened; fruit oblong-linear, 9–10 mm long, 2.5–3.5 mm across, with obtuse subfiliform dorsal and broadly winged lateral ribs, wings 0.75–1.25 mm wide; stylopodium short-conical. June–July. (Plate VIII, Figure 2.)

Dry slopes. – Caucasus: S. Transc. Endemic. Described from Saganluk Range. Type in Kiev (?).

2. *C. platycarpum* (Boiss. et Hausskn.) Schischk. in Bot. mat. Gerb. Glavn. Bot. Sada, IV (1923) 30; Grossg., Fl. Kavk. III (1932) 129. – *Grammosciadium platycarpum* Boiss. et Hausskn. in Boiss. Fl. or. II (1872) 901. – *Carpodium meoides* Stapf et Wettst. Die botan. Ergebn. d. Polak'schen Exped. nach Persien, II (1886) 49. – *Stenodiptera platycarpa* K.-Pol. in Russk. Bot. zhurn. 1, 2 (1915) 13. – Ic.: Koz.-Pol. l. c. tabl. on p. 16, fig. 3.

Perennial; entire plant glabrous; root vertical, ca. 5 mm thick; stem solitary, 10–40 cm high, branching nearly from base, glabrous, angular-ribbed, lateral branches as long as or overtopping central umbel; radical leaves narrowly lanceolate, 5–15 cm long, 1–2.5 cm wide, thrice pinnatisect, primary lobes sessile, the lower far apart, the upper approached, terminal lobules subulate, 3–7 mm long, ca. 0.2 mm thick. Umbels 5–5.8 cm across, of 8–14 unequal smooth ribbed rays; involucre of 5 pinnatisect leaflets with subulate lobules, becoming reflexed; umbellets 12–22-flowered, ca. 1.5 mm across; involucels of 3–5 spreading or reflexed subulate, partly 3-partite leaflets; calyx-teeth triangular, half the length of the stylopodium; marginal petals hardly elongated, ca. 1.5–2 mm long, with wide notch; fruit linear-oblong, 1.5–2 cm long, 2 mm wide, strongly compressed; lateral ribs narrowly winged; stylopodium cylindrical, ca. 1 mm long, gradually passing into 1.5 mm long thick conical style; stigma capitate. Fl. June, Fr. August.

Herbaceous slopes, thinned-out dry forests, 2,600 m. – Caucasus: S. Transc. Gen. distr.: Cataonia, Iran. Described from Cataonia and Iran. Type in Geneva.

- 125 Economic importance. At the Biochemical Laboratory of the Botanical Institute of the former Azerbaidzhan branch of the Academy of Sciences of the USSR, *C. platycarpum* was found to contain large amounts of essential oil (to 80% linalool). The yield of essential oil (1.5–2.5%) and linalool of *Carpodium* is superior to that of *Coriandrum savitum* L. (I. Yu. Gadzhiev, Izv. Azerbaidzh. fil. AN SSSR, 8 (1944) 18–19). Its widespread cultivation is recommended for the Azerbaidzhan SSR.

Note. This species should perhaps be called *Carpodium meoides* Stapf et Wettst. rather than *C. platycarpum* (Boiss. et Hausskn.) Schischk., as its first discovery by Boissier is based on the plant from Cataonia (Berit-Dagi). The Iranian (and Transcaucasian)

plants are not really identical with those from Cataonia. However, owing to the lack of material at the Herbarium of the V. L. Komarov Botanical Institute, this question cannot be satisfactorily settled and we therefore retain Boissier's name.

Genus 952. **ANTHRISCUS*** (Pers.) Hoffm.

Hoffm. Umbell. I (1814) 38; Pers. Syn. I (1805) 320, p.p. non Bernh. (1800).— *Chaerifolium* ** Hall. Hist. stirp. ind. Helv. (1768) 327.— *Cerifolium* Hall. l.c. (1768) 328; Bess. Prim. Fl. Galic. I (1803) 218

Calyx-teeth inconspicuous; petals white, yellowish-or greenish-white, the peripheral sometimes slightly elongated, obovate, the terminal notch with short inward curved ligule, cuneately tapering at base or abruptly passing into short broad claw; stylopodium conical; styles erect or recurved below. Fruit ovoid at base, short- or long-oblong, sometimes sublinear, laterally compressed; mericarps cylindrical, tapering into more or less long beak, ribs inconspicuous or faintly conspicuous, flattish, smooth, sometimes shiny, often covered with variously arranged prickles and bristles; stereomes in ribs cylindrical or elliptic in cross section; canals 1 in valliculae, 2 at commissure, nearly obsolete in ripe fruits. Albumen with shallow furrow; crystals numerous in region of commissure; carpophore free, split; base of fruit and ovary with distinct or obscure crown of prickles, or sometimes prickles absent. Perennial, biennial or annual herbs, glabrous or variously pubescent, with compoundly dissected leaves.

To 20 species in Europe and temperate Asia. Some European species have been introduced into N. America.

1. Perennials, rarely biennials, with thick root 2.
+ Annuals with thin, sometimes subfiliform root (section *Cerifolium* (Rchb.) Schischk.) 10.
2. Fruit 4–5 mm long, low plant, 15–40 cm high, growing on taluses and rocks in the alpine belt (Caucasus) 3.
+ Fruit 5.5–11 mm long; plant 50–150 cm high 4.
3. Petals pink or nearly white, the peripheral distinctly elongated (to 2.5 mm); terminal lobules of leaves 8–25 mm long
. 7. *A. ruprechtii* Boiss.
- + Petals white, the marginal hardly elongated (to 1.5 mm); terminal lobules of leaves 3–6 mm long 8. *A. sosnovskyi* Schischk.
4. Fruit beak very short, indistinct; leaves biternate, the terminal lobules large, with bidentate margin
. 9. *A. schmalhauseni* (Alb.) K.-Pol.

* From the Greek *enthricos* — Theophrastus' name (possibly referring to *Scandiz australis* L.) presumably derived from *anthos* — flower, *rhyskos* — fence, since the plant often occurs around fences.

** We reject the usage of many works where *Chaerifolium* Hall. is given priority (1758). Hallier's book (l.c., p. 327) gives only *Chaerifolium* referring to the two genera *Chaerophyllum* and *Cerifolium*. Yet the list of genera at the end of the second volume *Chaerifolium* is missing. It appears that *Cerifolium* has been printed in the text by mistake. According to the international rules *Anthriscus* has been adopted as a "nomen conservandum."

- 127
- + Fruit beak distinct, 0.5–1 mm; leaves tripinnate or ternately pinnate 5.
 - 5. Plant especially leaves almost entirely covered with thinly grayish pubescence; high-mountain plants (Caucasus and Central Asia) .. 6.
 - + Stems usually with coarse or fine hairs confined to lower part; leaves with coarse hairs mainly along petioles and petiolules, and along nerves on lower side of leaves; rarely almost entire plant glabrous 7.
 - 6. Fruit 6–7.5 mm, beak 0.5–1 mm long (Caucasus) 4. *A. velutina* Somm. et Lev.
 - + Fruit 8–9 mm, beak 0.5 mm long (Central Asia) 5. *A. glacialis* Lipsky
 - 7. Lower leaves ternately pinnate, lobes of the first order nearly as long as remaining part of blade, lobules of the last order ovate or oblong; crown of hairs at base of fruit absent or reduced to solitary bristles 6. *A. nitida* (Wahl) Garcke.
 - + Lower leaves tripinnate, lower lobes of the first order much shorter than the rest of the blade; crown of hairs mostly present 8.
 - 8. Crown of bristles under fruit weakly developed (European part of the USSR) 2. *A. silvestris* (L.) Hoffm.
 - + Crown of hairs well developed; fruit commonly with distinct tubercles, often with bristles, rarely glabrous 9.
 - 9. Fertile flowers 2–4 per umbellet; branches in upper part of stem alternate or opposite; fruit tuberculate, rarely smooth (Crimea, Caucasus). 1. *A. nemorosa* M. B.
 - + Fertile flowers 6–10 per umbellet; branches in upper part of stem whorled; fruit tuberculate, rarely (mainly in Asian part of the USSR) glabrous 3. *A. aemula* (Woron) Schischk.
 - 10. Fruit smooth 10. *A. cerefolium* (L.) Hoffm.
 - + Fruit densely covered with prickles 11.
 - 11. Fruit 4–5 mm long, with basal crown of white bristles 12. *A. scandicina* (Web.) Mansf.
 - + Fruit 7–10 mm long, without crown of bristles 11. *A. longirostris* Bert.

Section 1. *CACOSCIADIUM* (Rchb.) Schischk. — *Chaerophyllum* sect. *Cacosciadium* Rchb. Fl. Germ. excurs. (1832) 444. — *Chaerefolium* sect. *Cacosciadium* Thell. in Hegi, Illustr. Fl. Mitt. Eur. V, 2 (1926) 1016. — Biennials or perennials; root rather thick; umbels of 8–15 rays; beak not more than $\frac{1}{5}$ the length of the fruit.

Series 1. *Nemorosae* Schischk. — Lower leaves tripinnate, lower lobes of first order much shorter than the rest of the blade; crowns of hairs at base of fruit usually well developed.

1. *A. nemorosa* (M. B.) Spreng. Umbell. Prodr. (1813) 27; Hoffm. Umbell. 1 (1814) 45; Ldb. Fl. Ross. II, 347, ex p.; Boiss. Fl. or. II, 911; Grossg., Fl. Kavk. III, 130. — *A. taurica* Fisch. ex Loud. Hort. Brit.

(1830) 101, nom. nud. — *A. silvestris* Boiss. Fl. or. II, 910; Grossg., Fl. Kavk. III, 131, non L. — *A. silvestris* var. *nemorosa* Trautv. in Tr. Bot. Sada, V (1877) 437; Schmal'g., Fl. I, 422. — *Chaerophyllum nemorosum* M. B. Fl. taur.-cauc. I (1808) 232. — *Chaerofolium silvestre* subsp. *nemosum* Thell. in Hegi, III. Fl. V, 2 (1926) 1025, ex p. — *Ch. nemorosum* Bornm. in Fedde, Repert. XXV (1928) 281. — Ic.: Hoffm. Gen. Umbell. ed. 2, 1, f. 19.

Perennial; root to 1–5 cm thick, hollow; stem solitary, 50–120 cm high, 1–1.5 cm thick, hollow, ribbed, covered below with numerous scattered
 28 white stiff hairs, glabrous above, branching; radical leaves on long hairy petioles much longer than blades, these triangular, 13–25 cm long, 15–30 mm wide, tripinnate; terminal lobe on long hairy petiolule, the lateral lobes on shorter petiolules, their blades twice pinnatipartite; secondary lobes ovate, 2–3 cm long, 1.5–2 cm wide, the lower on short petiolules, the upper sessile, slightly decurrent, pinnatipartite, nerves with sparse stiff hairs beneath; upper leaves sessile, the slightly inflated sheath covered with long hairs. Umbels 3–8 cm across, of 8–11 thin glabrous rays; involucre 0; umbellets with glabrous pedicels; involucels of 5 light green ovate acuminate reflexed leaflets with ciliate margins; marginal petals ca. 3.5 mm long; fertile flowers 2–4 per umbellet; fruit cylindrical-oblong, 7 mm long, 2–3 mm wide, shiny, tapering to short beak, glabrous or covered with short antrorse bristles sessile on very small tubercles, crown at base of fruit with white bristles; stylopodium conical; styles erect at first, becoming recurved below, much longer than stylopodium. May–July.

Forests, forest glades, subalpine meadows, 2,400 m. — European part: Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. Gen. distr.: Arm.-Kurd., Iran., As. Min. Described from Terek River (Caucasus). Type in Leningrad.

Note. For the Caucasus Boissier reports var. *mollis* (Boiss. Fl. or II (1872) 911), with glabrous stem base and leaves pubescent on both sides (Dagestan, Dzhul'ti-Chai, tributary of Samur River).

2. *A. silvestris* (L.) Hoffm. Umbell. ed. 1 (1814) 40; Ldb. Fl. Ross. II, 346; Schmal'g., Fl. I, 422; K.-Pol. in Fl. Az. Ross. No. 15, 102, subsp. excl. — *A. elatior* Bess. Enum. pl. Volhyn. Podol. (1822) 55. — *Chaerophyllum silvestre* L. Sp. pl. (1753) 258. — *Ch. tumidum* Gilib. Fl. lithuan. II (1782) 28. — *Cerrefolium silvestre* Bess. Prim. Fl. Galic. I (1809) 218. — *Myrrhis silvestris* Spreng. Umbell. Prodr. (1813) 29. — *Myrrhodes silvestris* Ktze. Rev. Gen. I (1891) 268. — *Chaerofolium silvestre* Schinz et Thell. in Vierteljahr. Nat. Ges. Zürich. LIII (1909) 554. — Ic.: Rechb. Ic. Fl. Germ. XXI, tab. 2024; Kozo-Pol. in Fl. Az. Ross. XV, 86 (fruit). — Exs.: G. R. F. No. 1164, No. 1164a; Pl. Finl. exs. No. 835; Fl. pol. exs. No. 821, No. 1031 (sub *Cerrefolium nitido*).

Biennial or perennial; root fusiform, slightly thickened; stem erect, 50–120 cm high, hollow, deeply furrowed, obscurely scabrous along ribs in lower half, branching and glabrous in upper part; leaves triangular, tripinnate; lower leaves 15–30 cm long and as wide, first pair of first-order
 129 lobes much shorter than remaining part of blade, primary and lower secondary lobes petioluled, the tertiary sessile, 2–6 cm long, 5–15 mm wide,

lanceolate, acute, deeply pinnatisect into oblong-lanceolate or linear serri-form-dentate 3–15 mm long lobules, with scabrous margins; petioles of lower leaves long, of upper reduced, sheaths with short spreading hairs along nerves. Umbels at apex of stem and branches in corymbiform inflorescence of 8–15 equal glabrous rays; involucre 0; involucels of 5 ovate-lanceolate reflexed acute leaflets with ciliate margins; calyx teeth obsolete; 4–8 fertile flowers per umbellet, petals white, the peripheral slightly elongated, slightly notched, hardly curved inwards; crown of bristles at base of fruit faint; fruit 6–7 mm long, 2 mm wide, smooth, shiny, gradually tapering towards tip. June–July.

Floodplain meadows, willow woods, fruit gardens, parks, ravines, gorges, thinned-out forests, groves. — European part: Kar.-Lap., Lad.-Ilm., Balt., Dv.-Pech., U. V., V.-Kama, U. Dnp., U. Dns., Bes., M. Dnp., L. Don, Transv., L. V. Gen. distr.: Scand., Centr. and Atl. Eur., introduced in N. Am. Described from fruit gardens of Europe. Type in London.

Economic importance. Sometimes encountered as weed along edges of fields. According to G. V. Pigulevskii the root contains 20.3% starch, 5.7% glucose, 3.3% disaccharide, and 10.5% cellulose.

3. *A. aemula* (Woron.) Schischk. comb. nov. — *A. silvestris* var. *aemula* Woron. in Fl. Yugo-Vost. Evrop. ch. SSSR, V (1931) 770. — *A. nemorosa* Ldb. Fl. Ross. II, 347, exp. — *A. silvestris* β *nemorosa* Schmalh. Fl. I, 422, p. p. — *A. silvestris* α *typica* et β *nemorosa* Kryl., Fl. Alt. III (1903) 539. — *A. silvestris* subsp. *nemorosa* K.-Pol. in Fl. Az. Ross. XV (1920) 103. — *A. silvestris* var. *genuina* et var. *nemorosa* Kryl., Fl. Zap. Sib. VIII (1935) 2032.

Biennial or perennial; stem 50–120 cm high, furrowed, glabrous or short-haired below, branches whorled above, 3–9 per whorl; leaves triangular, with scattered stiff hairs especially along nerves beneath, tripinnate, 15–30 cm long, 1–2 cm wide, lanceolate or ovate, usually acute, deeply pinnatisect into lanceolate or oblong-ovate lobules 3–7 mm long, 2–4 mm wide, dentate with scarious margin; petioles of lower leaves long, of upper reduced, the oblong sheath usually densely pubescent especially along nerves, often villous and long-haired at base and margins. Umbels 3–8 cm across, of 7–11 smooth, somewhat irregular rays; fertile flowers 6–10 per umbellet; involucre 0; involucels of 5 ovate-lanceolate, more or less long-acuminate scarious leaflets sometimes exceeding umbellets, with long-ciliate margin becoming reflexed; fruit oblong-cylindrical or oblong, 7–8(11) mm long, 2–3 mm thick at base, covered with acute tubercles, sometimes with mixed sessile antrorse bristles, or fruit tapering into short beak, much shorter than conical stylopodium; style slightly longer than stylopodium, becoming recurved. June–July.

Meadows in fluvial plains, hairgrass meadows, conifer forests, pine forest, felled areas, mountains to upper timber. — European part: Dv.-Pech., V.-Kama; W. Siberia: all regions; E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu., Kamch., Okh., Sakh., Uda, Uss.; Centr. Asia: Syr D. (in gardens), Dzu.-Tarb., T. Sh., Pam.-Al. (?). Gen. distr.: Dzu.-Kash., Mong., Manchuria. Described from SE European part of USSR. Type in Leningrad.

4. *A. velutina* Somm. et Lev. in Nuovo Giorn. bot. ital. (1895) 73 and in Tr. Bot. Sada XVI (1900) 182; Grossg., Fl. Kavk. III, 130.

Perennial; root ca. 1.5 cm thick, its neck covered with remnants of leaves; stem hollow, 60–80 cm high, branching, very short-haired, slightly furrowed above; radical leaves with petioles 50 cm long, 30 cm wide, triangular, shortly and densely velutinous, gray-haired, the petioles passing into dark orange, scarious, hairy or smooth sheath; primary lobes tri-pinnatisect on very long, secondary on long and tertiary lobes on short petioles, the latter ovate, acute, pinnatifid or pinnatipartite, lobules of the last order linear-lanceolate, acute. Umbels long-pedunculate, with 5–11 thin smooth rays, ca. 3.5 cm long; involucre 0 or unifoliate; involucels of 5 submembranous lanceolate acuminate pubescent reflexed leaflets nearly as long as pedicels; pedicels glabrous, with crown of short white hairs below fruit; petals white, the peripheral elongated to 1.5–2 mm; fruit linear-oblong, smooth or tuberculate with setose tubercles, dark brown, shiny, 6.5–8 mm long, ca. 1 mm wide, with ca. 1 mm long beak; stylopodium conical; styles ca. 1 mm long, erect, becoming slightly divergent. Fl. May–June, Fr. July–August.

Taluses, southern slopes, subalpine meadows, 1,200–2,600 m. – Caucasus: Cisc. (western part), W. Transc. Endemic. Described from the Tèberda River valley at 1,500 m. Type in Florence.

131 5. *A. glacialis* Lipsky in Tr. Bot. Sada, XXIII (1904) 145.

Perennial; stem 100–180 cm high, hollow, furrowed, usually with short and soft pubescence below, glabrous, branching above; leaves triangular-ovate, grayish, with soft-hairs on both sides, usually more profuse beneath; main petiole with beards of rather long white hairs at base of primary leaflets, gradually broadening into villous sheath, terminal lobes lanceolate, attenuate, acute, dissected into oblong-lanceolate lobules; upper leaves less dissected, with long linear lobes, or of single long leaflet. Umbels 2.5–3 cm across, of 7–12 glabrous thin, subsequently thickening rays; involucre 0 or unifoliate, early deciduous; involucels of 5–6 scarious ovate acute leaflets with ciliate margins becoming reflexed; fruit cylindrical, 8–9 mm long, ca. 2 mm across, shiny, densely covered with tubercles bearing white sessile antrorse bristles, fruit tapering into very short beak; stylopodium short-conical, tapering to recurved style. June–July.

Mountain forests and near glaciers. – Centr. Asia: T. Sh. (Talass Ala-Tau, upper reaches of Ispaisai, Susamyr, nomad camp Avloz, Fergana), Pam.-Al. (Karategin, Yagnob, Darvaza, Gissar, Alai Range). Endemic. Described from Anzob Pass and others. Type in Leningrad.

Series 2. *Nitidae* Schischk. – Lower leaves ternately pinnate, lower lobes of first order nearly as long as remaining part of blade; crown of hairs at base of fruit obsolete or represented by solitary bristles.

6. *A. nitida* (Wahl.) Garcke, Fl. Deutschl. ed. VII (1865) 180; Shmal'g., Fl. I, 422. – *A. alpestris* Wimm. et Grab. Fl. Silles. I (1827) 289. – *A. silvestris* β *alpestris* Wimm. Handb. Fl. Schles. (1831) 144. – *A. dubia* Kabath, Fl. v. Gleiwitz (1846) 80. – *A. abortiva* Jord. Observ. 7-ème frag. (1849) 28. – *A. humilis* Bess. Catal. Hort. Crem. Suppl. IV et in Schult. Syst. veget. VI (1820) 522; Bess. Enum. Volhyn. (1822) 13. –

A. torquata Duby, Bot. Gall. I (1828) 299. — *A. silvestris* β *nitida* Briquet in Ann. conserv. bot. G n ve, IV (1900) 196. — *Chaerophyllum nitidum* Wahl. Fl. Carp. (1814) 85. — *Ch. cadonense* Spreng. in Schult. Syst. veget. VI (1820) 522. — *Ch. polonicum* Jastrz. ex Rostaf. Fl. Polon. Prodr. (1871) 112, nom. nud. — *Cerefolium nitidum* Czel. Prodr. Fl. Bohem. (1871) 586. — *C. silvestre* β *nitidum* Beck, Fl. Nied.- sterr. (1892) 631. — *Selinum nitidum* E. H. L. Krause in Sturm, 132 Fl. Deutschl. ed. 2, XII (1904) 69. — *Myrrhodes alpestre* O. Kuntze, Rev. Gen. (1891) 268. — *Chaerophyllum silvestre* subsp. *alpestre* var. *nitidum* Thellung in Hegi, III, Fl. V. 2 (1926) 1024. — *Ch. nitidum* Domin in Preslia, XIII–XV (1935) 157. — Ic.: Verz. d. Bot. Ver. Brand. VI, Taf. 1; Fl. Yugo-Vost. V, fig. 510 (sub *A. silvestri*). — Exs.: Fl. exs. austro-hung. No. 1315.

Biennial or perennial; stem hollow, branching, 40–80 cm high, ribbed, the lower part covered with soft hairs, but glabrous towards apex, pubescent only at nodes; petioles of radical and lower cauline leaves bearing scattered soft or bristly hairs, ternately pinnate, the petioles of the lower lobes of the first order as long as the remaining part of the blade, secondary lobes ovate, sessile or very short-petioluled, pinnately dissected into ovate dentate or shallowly dentate lobules; blade glabrous or short-haired along nerves beneath; sheath of cauline leaves oblong; upper leaves ternate, sessile on dilated sheath; leaflets pinnatifid. Umbels 3–4 cm across, of 5–11 thin rays, enlarging in fruit; involucre 0; umbellets in fruit without wreath of bristles, rays glabrous; involuclers of 5 ovate short-ciliate acuminate reflexed leaflets; 2–4 fertile flowers per umbellet; peripheral petals slightly elongated (to 1.5 mm); fruit cylindrical-oblong, ca. 6 mm long, smooth, shiny, with very short beak. May–July.

Shady forests. — European part: Balt. (Lithuania), M. Dnp., U. Dns. **Gen. distr.:** Centr. Eur. (E.), Bal. Described from the Carpathians. Type in Uppsala.

Section 2. CAROIDES Boiss. Fl. or. II (1872) 913. — Perennials, with rather thick root; umbels of 3–9 rays; fruit sometimes with nearly obsolete beak.

7. *A. ruprechtii* Boiss. Fl. or. II (1872) 914; Grossg., Fl. Kavk. III, 129.

Perennial; root vertical or ascending, 4–6 mm thick; plant glabrous, only the leaf sheaths with finely ciliate margins; stems numerous, 20–40 cm high, erect or ascending from base, furrowed, slightly branching nearly from base; radical leaves oblong, 5–20 cm long, 1–6 cm wide, bi- 135 pinnatisect, long-petioled; lobes of the last order lanceolate-ovate or lanceolate-linear, 3–20 mm long, 1–2 mm wide, entire or with 2–3 teeth; sheaths oblong, with scarious margins; cauline leaves smaller, the upper sessile on sheath, with few linear lobes. Umbels 1–2 cm across, of 3–8 irregular smooth rays; leaflets of involucler 2–3, lanceolate-ovate, acuminate, ciliate or glabrous, sometimes violet-colored becoming reflexed; petals pink, sometimes nearly white, slightly notched with short inward curved apex, the peripheral petals of umbel elongated; crown of bristles at base of fruit absent; fruit oblong-cylindrical, 5 mm long, ca. 1 mm wide,

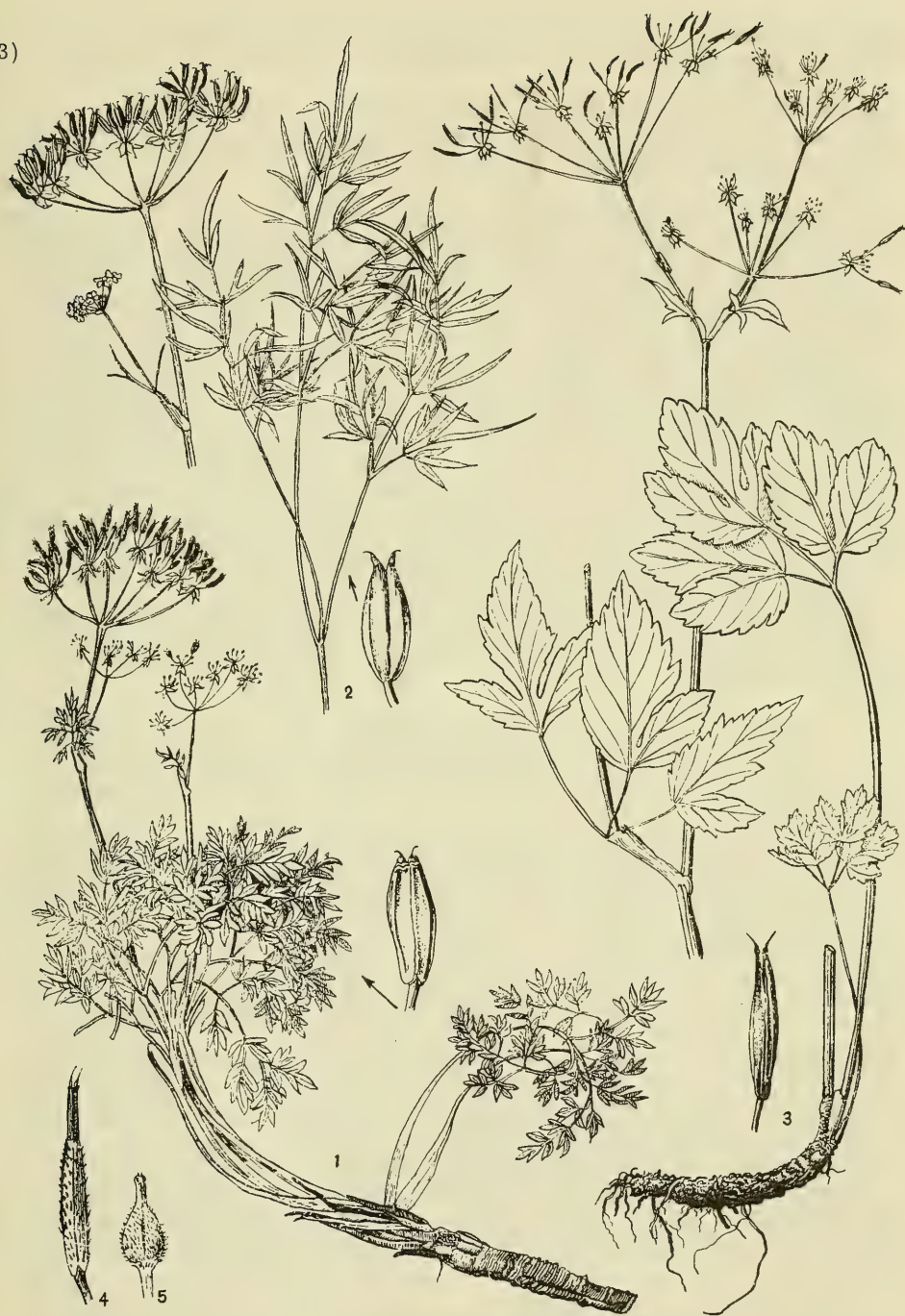


PLATE IX. 1 — *Anthriscus sosnovskyi* Schischk; 2 — *A. ruprechtii* Boiss.; 3 — *A. schmalhausen* (Alb.) K.-Pol.; 4 — *A. longirostris* Bert.; 5 — *A. scandicina* (Web.) Mansf.

shiny when ripe, with very short inconspicuous beak; stylopodium short-conical; styles twice as long as stylopodium, recurved. July–August. (Plate IX, Figure 1.)

Taluses and glacial moraines, 2,000–2,700 m. – Caucasus: Main Range (eastern half). Endemic. Described from Lake Tane and Angabal Mountain. Type in Geneva, cotype in Leningrad.

8. *A. sosnovskyi* Schischk. in Bot. mat. Gerb. Bot. Inst. AN SSSR, XIII (1950) 157. – *A. kotschyi* Grossh., Fl. Kavk. III (1939) 129, non Boiss.

Perennial; root vertical, rather thick; entire plant glabrous; stems numerous, ascending at base, sulcate, 15–40 cm high, slightly branching nearly from base; radical and lower cauline leaves more or less long-petioled, oblong, 5–20 cm long, 2–6 cm wide, bipinnatisect; lobes of the last order ovate, entire or tripartite, 2–10 mm long, 2–6 mm wide; sheaths oblong or oblong-linear, scarious at margins, glabrous or soft-ciliate at margin; upper cauline leaves smaller and not as dissected. Umbels of 4–7 smooth rays; involucre absent; involucels of 2–5 ovate or ovate-lanceolate, long-acuminate, glabrous or obscurely ciliate persistent leaflets; petals white, the marginal hardly elongated (to 1.5 mm long); fertile flowers from 3 to 7 in umbellets; fruit cylindrical, 4 mm long, with obscure beak, shiny; stylopodium conical; styles slightly longer than stylopodium, recurved. July–August. (Plate IX, Figure 1.)

Taluses in alpine zone. – Caucasus: W. Transc. (Adzhar-Shavshetskii Range). Gen. distr.: Arm.-Kurd. (Artvin). Described from Artvin. Type in Leningrad.

9. *A. schmalhauseni* (Alb.) K.-Pol. in Bull. Soc. Nat. Mosc. XXIX (1915) 283 and in Bot. mat. Gerb. IV (1923) 70. – *Chaerophyllum schmalhauseni* Alb. in Bull. l'Herb. Boiss. II (1894) 451; Grossg., Fl. Kavk. III, 126.

136 Perennial; rhizome creeping, 5–10 mm thick; stems few, erect, 50–80 cm high, ascending from base, glabrous or short-haired below, furrowed; leaves dark green, biternate; radical leaves with long (10–25 cm) petioles, their blade triangular-ovate, 4–10 cm long, 4–12 cm wide; primary lobes petioluled, secondary lobes ovate, sessile, largely bidentate, sometimes lobate at base, 1.5–8 cm long, 1–5 cm wide; uppermost leaves tripartite. Umbels 2.5–4 cm across, of 6–9 thin, glabrous, somewhat irregular rays; involucre 0; involucels of 5 pale green ovate acute leaflets with ciliate margins becoming reflexed; fruit cylindrical, 5.5–7 mm long, not ribbed, shiny, tapering to very short beak; stylopodium conical, abruptly passing into divergent capitate styles, 3–4 times as long as the stylopodium. Fl. April–May, Fr. July. (Plate IX, Figure 3.)

Hazel, beech and other shady forests, 2,200 m. – Caucasus: Cisc. (S. Ossetia, Ananuri), W. Transc. (Abkhazia, Guria, Imeretia), E. Transc. (Borzhomi District, Gvir-gvina Range). Endemic. Described from Abkhazia (Psykhtha Mountain). Type in Geneva, cotype in Leningrad (?).

Section 3. CEREFOLIUM (Rchb.) Schischk. – *Anthriscus* subgen. *Cerefolium* Rchb. Consp. (1828) 141. – *Chaerefolium* sect.

Cerefolium Thell. in Hegi, III. Fl. V, 2 (1926) 1016. — Annuals; root thinly fusiform; umbels of 2–6 rays; fruit beak not less than $\frac{1}{4}$ the length of the fruit.

10. *A. cerefolium* (L.) Hoffm. Umbell. ed. 1 (1814) 41; Ldb. Fl. Ross. II, 348; Boiss. Fl. or. II, 973; Schmal'g., Fl. I, 422; Grossg., Fl. Kavk. III, 130. — *A. sativus* Bess. Enum. Volhyn. (1822) 13. — *Scandix cerefolium* L. Sp. pl. (1753) 257. — *S. tenuifolia* Salisb. Prodr. (1796) 166. — *Chaerophyllum cerefolium* Crantz, Stirp. Austr. ed. 1, III (1767) 70. — *Ch. sativum* Lam. Fl. Franç. III (1778) 438. — *Cerefolium sativum* Bess. Prim. Fl. Galic. I (1809) 215. — *Myrrhodes cerefolium* O. Kuntze, Rev. Gen. (1891) 268. — *Selinum cerefolium* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 73. — *Chaerophyllum cerefolium* Schinz et Thell. in Viert. Nat. Ges. Zur. LIII (1909) 554. — *Ch. c. β sativum* Thell. in Hegi, Illustr. Fl. Mitteleur. V, 2 (1926) 1029. — *Cerefolium cerefolium* Britt. in Britt. a. Br. III. Fl. ed. 2, II (1913) 629. — Ic.: Hoffm. l.c. tab. I, f. 21; Syreishch., Fl. Mosk. gub. II (1910) 423.

Annual; root thin, fusiform, erect or ascending; stems erect, 15–50 cm high branching nearly from base, short-haired at nodes, slightly inflated under nodes; leaves triangular or triangular-ovate, tripinnatisect, the lower with long petioles passing into linear-oblong scarious sheath with soft-ciliate margin; primary and secondary lobes petioluled, lobes of the last order cut into oblong-ovate acute lobules; petioles, petiolules and leaves with sparse spreading hairs along nerves beneath; upper leaves smaller, sessile on oblong sheaths with soft-ciliate margins. Umbels 1.5–2.5 cm across at flowering, the 3–6 rays covered with short spreading hairs especially below, lateral umbels on short peduncles or subsessile; involucre 0; involucels of 1–4 linear-lanceolate or linear narrowly scarious acute leaflets with ciliate margin; petals white, ca. 1 mm long, oblong-obovate, notched with inward recurved tip; rays of umbellets not thickened in fruit, shorter than fruit, without apical crown of bristles; fruit linear-oblong, 7–10 mm long, ca. 1 mm across, when ripe brownish, smooth, with beak $\frac{1}{3}$ the length of the fruit; fertile flowers 4–6 per umbellet. April–May.

Thinned-out forests, shrubby formations. — European part: Lad.-Ilm., Balt., U. Dnp., M. Dnp., U. Dns. Gen. distr.: Scand., Centr. and Atl. Eur., Med. Described from S. Europe. Type in London.

11. *A. longirostris* Bertol. Fl. ital. III (1837) 197, — *A. cerefolium* M. B. Fl. taur.-cauc. III (1819) 237, non Hoffm.; Boiss. Fl. or. II, 913, ex. p. — *A. trichosperma* Spreng. ap. Roem. et Schult. Syst. veg. VI (1820) 525, nec Pers. (1805); Ldb. Fl. Ross. II, 348; Grossg., Fl. Kavk. III, 130. — *A. cerefolium β trichosperma* Wimm. et Grab. Fl. Siles. I (1827) 291; Koch ap. DC. Prodr. IV (1830) 224; Shmal'g., Fl. I, 422. — *A. cerefolium* subsp. *trichosperma* Drude in Pflanzenfam. III, 8 (1898) 152. — *Chaerophyllum sativum* M. B. Fl. taur.-cauc. I (1808) 232, nec Lam. — *Ch. trichospermum* Schult. Oesterr. Fl. ed. 2, I (1814) 504, nec Lam. (1783). — *Ch. cerefolium b. trichospermum* Ashcers. Fl. Brand. (1864) 534. — *Cerefolium trichospermum*

Bess. Enum. Volhyn. et Podol. (1822) 44. — *Scandix trichosperma* Schur, Enum. pl. Transsilv. (1866) 963, non L. — *Chaerofolium cerefolium* α *trichospermum* Schinz et Thell. Fl. Schweiz. 3 Aufl. II (1914) 259. — Exs.: G. R. F. No. 971 (sub *A. trichosperma*); Fl. polon. exs. No. 41 (sub *Ceref. silv.*).

- Annual; root thin; stem erect or ascending from base, 20–80 cm high, branching from base or above, with few oblique branches, glabrous, rarely with spreading soft hairs at nodes, more or less inflated under nodes;
 138 leaves triangular-ovate, tripinnatisect, the long petioles of the lower leaves passing to linear-oblong scarious sheaths with soft villous margins; primary and secondary lobes petioluled, those of the last order pinnatifid into ovate acute lobules; petioles, petiolules and leaves with sparse spreading hairs beneath, upper leaves smaller, sessile, the oblong sheath covered with cilia. Umbels of 2–4 glabrous or short-haired rays, the lateral on short peduncles or subsessile; involucre 0; involucels one-sided, of 1–4 linear-lanceolate acute leaflets with scarious ciliate margins; petals white, ca. 1 mm long, oblong-obovate, notched with inward recurved tip; umbelet rays thickened in fruit, shorter than fruit, without crown of bristles; fruit linear-oblong, 8–10 mm long, ca. 1.5 mm across, when ripe black, with tubercles and bristles, tapering to beak $\frac{1}{3}$ to $\frac{1}{2}$ the length of the fruit proper. April–July. (Plate IX, Figure 4.)

In groves, shrubs, weedy places, gardens, roadsides, lower gorges of mountain streams. — European part: Bl., L. Don, L. V., Crim.; Caucasus: Cisc., Dag., E., W. and S. Transc.; Centr. Asia: Kara K., Mtn. Turkm. Gen. distr.: Centr. Eur., Med., Bal.-As. Min. Described from Italy. Type in Bologna.

12. *A. scandicina* (Web.) Mansf. in Fedde, Report. XLVI (1939) 309. — *A. vulgaris* Pers. Syn. I (1805) 320, nec Bernh. (1800); DC. Prodr. IV, 224; Ldb. Fl. Ross. II, 349; Shmal'g., Fl. I, 421; Grossg., Fl. Kavk. III, 130. — *A. caucalis* M. B. Fl. taur.-cauc. I (1808) 230. — *A. scandix* Aschers. Fl. Brand. I (1860) 260, non M. B. (1808). — *A. chaerophyllea* Druce in Ann. Scot. Nat. Hist. (1906) 221. — *A. anthriscus* Karst. Deutschl. Fl. (1882) 857. — *Scandix anthriscus* L. Sp. pl. (1753) 257. — *S. hispida* Gilib. Fl. lithuan. II (1782) 27. — *S. laeta* Salisb. Prodr. (1796) 167. — *Caucalis royeri* Crantz, Cl. Umb. Emend. (1767) 109, non L. — *C. scandix* Scop. Fl. carn. ed. 2 (1772) 191. — *C. aequicolum* All. Fl. Pedem. II (1772) 33. — *C. scandicina* Web. in Prim. Fl. Hols. (1780) 23. — *Torilis anthriscus* Gaertn. Fruct. (1788) 83, non Gmel. (1805). — *T. lanuginosa* Clairv. Man. Herb. (1811) 78. — *Chaerophyllum anthriscus* Crantz, Class. Umbell. (1767) 76. — *Myrrhis chaerophyllea* Lam. Fl. France, (1778) 442. — *M. anthriscus* Lag. Amen. Nat. (1821) 98. — *Myrrhodes anthriscus* Kuntze, Rev. gen. (1891) 268. — *Cerefolium anthriscus* G. Beck in Annal. Natur. Hofmus. Wien, X (1895) 210. — *C. vulgare* Bub. Fl. Pyr. II (1900) 411. — *Chaeropholium anthriscus* Schinz et Thell. in Viert. Nat. Ges. Zürich, LIII (1909) 554 et in Hegi, III. Fl. V, 2 (1926) 1030. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 2029. — Exs.: G. R. F. No. 1769.

- 139 Annual; root thin, fusiform; stem ascending or erect 15–80 cm high, glabrous, delicately furrowed; leaves triangular-ovate, the long petioles

passing into linear-oblong sheath with scarious villous-ciliate, rarely glabrous margins; blades tripinnatisect, covered beneath with rather long spreading stiff hairs (as is rhachis); primary lobes ovate, more or less long-petioluled; lobes of the last order ovate or oblong. Umbels short-pedunculate, of 2-5 smooth rays; involucre 0; leaflets of involucels 2-5, shifted to one side, ovate-lanceolate, acute or acuminate, with narrow scarious ciliate margin; petals greenish-white, notched, with very short inward curved tip; pedicels thickened in fruit, with terminal corona of white bristles; fruit narrowly ovoid, 4-5 mm long, ca. 1.5 mm wide, abruptly tapering to beak $\frac{1}{4}$ the length of the fruit; fruit covered with bristles; with hamate apex, sessile on tubercles; stylopodium and styles very short. May-June. (Plate IX, Figure 5.)

Stony, sometimes shrubby slopes, often weeds of roadsides, dwellings, etc.—European part: Crim., Bl., U. Dns. (report for Bes. not confirmed); Caucasus: Cisc., W. and E. Transc. Gen. distr.: Centr. and Atl. Eur., Med., Bal.-As. Min., introduced in N. Am. and New Zealand. Described from W. Germany. Type unknown.

Genus 953. **SCANDIX** * L.

L. Sp. pl. (1753) 256.—Pecten Lam. Fl. Fr. III (1778) 437.—Pectinaria Bernh. Syst. Verz. Erf. (1800) non Haw.—Wylia Hoffm. Umbell. ed. 1 (1814) 3, p. p.

Flowers nearly always bisexual, partly staminate; calyx-teeth inconspicuous; petals white, the peripheral often elongate, oblong-obovate, slightly notched, with inward curved lobule; stylopodium short-conical; styles erect, nearly as long or 3-4 times as long as stylopodium; fruit oblong-linear, with long beak, seed-bearing part laterally compressed, beak more or less compressed dorsally, $1\frac{1}{2}$ to 4 times as long as the seed-bearing part; mericarps subcircular in cross section with 5 primary thin ribs; between ribs rugulose, usually becoming bristly towards tip; ribs with bundles of stereomes; canals inconspicuous in ripe fruit; beak faintly or strongly set-off from seed-bearing part, with bristles along all ribs or only along the margin; carpophore deeply 2-partite; albumen subrounded to horseshoe-shaped in cross section, dorsally inflated, ventrally deeply incised with inturned margins. Annuals, with bipinnate or tripinnate leaves.

Fifteen to 20 species in the Mediterranean floral region.

1. Beak very slightly compressed laterally, not sharply set-off from seed-bearing part, all ribs covered with bristles 2.
- + Beak markedly compressed, sharply set-off from seed-bearing part of fruit, bristles confined to marginal ribs 4.
2. Style 3-4 times as long as the stylopodium, 0.7-1 mm long; leaflets of involucels elliptic, obtuse with broad scarious margins; peripheral petals usually elongated to 5 mm 4. *S. falcata* Lond.
- + Style as long as or shorter than stylopodium, not exceeding 0.2 mm; leaflets of involucels pinnate or entire, narrowly linear, acute, almost not scarious; peripheral petals slightly elongated, ca. 1.5 mm long . . . 3.

* From the Greek *xandix* — comb, referring to the appearance of the ripe umbel of *Scandix pecten Veneris* L.

3. Leaflets of involucels pinnatisect 5. *S. stellata* Soland.
- + Leaflets of involucels entire, narrowly linear 6. *S. aucheri* Boiss.
4. Terminal umbels of (5)6–9 rays; leaflets of involucels with white
scarious long-ciliate margins; peripheral petals to 5–8 mm long . . .
. 3. *S. iberica* M.B.
- + Terminal umbels of 2–3(4) rays; leaflets of involucels with barely
discernible border, often with 2 terminal slits; peripheral petals
hardly elongate, to 2–3 mm 5.
5. Fruit large, commonly 4–7 cm long, beak ca. 2 mm wide; style 1–
1.5 mm long 1. *S. pecten* Veneris L.
- + Fruit 2.5 cm long, beak 1 mm wide; style 0.5–0.6 mm long
. 2. *S. persica* Mart.

Subgenus 1. *Pecten* (Duby) Thell. in Hegi, *Illustr. Fl. Mitteleur.*, V, 2 (1926) 1037. — *Scandix* sect. *Pecten* Duby in *Synops. pl. in Fl. Gall. ed. 2, I* (1828) 240. — Beak markedly flattened dorso-ventrally, with glabrous dorsal ribs and bristles confined to margins.

- 141 1. *S. pecten-Veneris* L. *Sp. pl.* (1753) 256; Ldb. *Fl. Ross.* II, 345; Boiss. *Fl. or.* II, 914; Shmal'g., *Fl. I.*, 420; Kozo-Pol. in *Fl. Az. Ross.* XV (1920) 55; Grossg., *Fl. Kavk.* III, 132. — *S. pecten* Scop. *Fl. carn. ed. 2, I* (1772) 211. — *S. vulgaris* S. Gray, *Nat. Arr. Brit. Pl.* II (1821) 503. — *S. cornuta* Gilib. *Fl. lithuan.* IV (1782) 27. — *S. rostrata* Salisb. *Prodr.* (1796) 166. — *S. pectinifera* Stokes, *Bot. Mat. Med.* II (1812) 122. — *S. pectiniformis* St. Lager in *Ann. Soc. Bot. Lyon*, VII (1880) 80. — *S. iberica* var. *parviflora* O. Ktze. in *Tr. Bot. Sada*, X (1887) 192. — *Chaerophyllum pecten veneris* Crantz, *Stirp. Austr. ed. 1, II* (1767) 66. — *Ch. rostratum* Lam. *Encycl.* I (1783) 685. — *Pastinaca pecten veneris* Lam. *Fl. Fr.* III (1778) 437. — *Myrrhis pecten veneris* All. *Fl. Pedem. ed. 2, II* (1772) 29. — *Pectinaria vulgaris* Bernh. *Syst. Verz. Erf.* (1800) 168. — *Wyglia pecten veneris* Bubani, *Fl. Pyren.* II (1900) 407. — *Selinum pecten* E. H. L. Krause in Sturm, *Fl. Deutschl.* 2 Aufl. XII (1904) 75. — Ic.: *Fl. Aziat. Ross.* XV (1920) 30. — Exs.: H. F. A. M. No. 26.

Annual; root thin, fusiform; stems solitary or many, erect or ascending, cylindrical, thinly ribbed, branching, like petioles spreading-hairy or subglabrous, 15–50 cm high; leaves twice or four times pinnatisect, terminal lobes linear or subfiliform, mucronate, with scabrous-ciliate or scattered-bristly margins, lower lobes sessile on narrow sheaths, with whitish-scarious margins, upper lobes on short to barely inflated sheaths with scarious margins. Umbels terminal and apparently opposite leaves, of 1–3 commonly glabrous rays; involucre 0; umbellets 10-flowered, ca. 1 cm across; leaflets of involucels ovate or oblong, very often incised above, nearly as long as umbel, with ciliate margin; flowers partly bisexual, partly staminate; petals white, the peripheral hardly elongated, to 2–3 mm long; fruit 2–7 cm long, beak 3–4 times as long as seed-bearing part of fruit, strongly flattened, the marginal ribs covered with bristly hairs, otherwise smooth; style erect, 1–1.5 mm long. April–May.

Gardens, fields, edges of fields, wheat crops. — European part: Crim.; Caucasus: Dag., E. and S. Transc., Tal.; Centr. Asia: Syr D., Amu D., T. Sh. (W.), Pam.-Al., Mtn. Turkm. Gen. distr.: Centr. Eur., Atl. Eur., Scand. (S.), W. and E. Med., Arm.-Kurd., Bal.-As. Min., Iran., Ind.-Him. Introduced in S. Africa, N. America, Chili, New Zealand, etc. Described from Germany and S. Europe. Type in London.

Economic importance. A weed, mainly of spring crops.

2. *S. persica* Mart. in Hort. Monac. (1837) 4 et in Linnaea, XII (1838) Litter. p. 87; Grossg., Fl. Kavk. III, 132. — *S. pecten veneris* β
142 *brevirostris* Boiss. Fl. or. II (1872) 915. — *S. macrorrhyncha* Boiss. l. c., 916, p. p. vix C. A. M.

Annual; root thin; stem ascending from base or erect, 20 cm high, solitary, cylindrical, thinly ribbed, branching above; leaves ovate, twice or four times pinnatisect, terminal lobes subfiliform, mucronate, scattered-hairy or glabrous, the lower on more or less long petioles, abruptly broadened to oblong sheath with scarious margins, upper lobes sessile on short oblong sheaths with scarious margins. Umbels terminal and apparently opposite leaves, of 1–3, usually glabrous rays; involucre 0; umbellets 5–9-flowered with 3–6 fertile flowers per umbel; leaflets of involucels ovate, with 2 terminal slits, with hardly scarious or thinly ciliate margins, nearly as long as pedicels becoming reflexed; petals white, fruit ca. 2.5 cm long, beak thin, ca. 1 mm wide, strongly flattened with bristly margins, otherwise glabrous; styles erect, very short, 0.5–0.6 mm long.

Dry slopes. — There are no reliable records from within the USSR, but known from the border of S. Transcaucasia (former Kagyzman district, Novo-Nikolaevka). Gen. distr.: Iran. Described from specimens grown from seeds collected in Iran. Type in Munich?

Note. Boissier (Fl. or. II, 915) reports *S. macrorrhyncha* C. A. M. for Khanlar (former Elenendorf), but it is difficult to be certain of Meyer's conception since his species was described after garden specimens grown from seeds of unknown origin.

3. *S. iberica* M. B. Fl. taur.-cauc. I (1808) 425; Ldb. Fl. Ross. II, 346; Boiss. Fl. or. II, 915; Grossg., Fl. Kavk. III, 132. — *S. georgica* C. Koch ex Boiss. Fl. or. II (1872) 915, nom. — *S. falcata* M. B. Fl. taur.-cauc. I, 230, non Lond. — *S. eriocarpa* Stapf et Wettst. ex Stapf in Denkschr. Acad. Wien, II (1886) 29. — *Wylia iberica* Hoffm. Umbell. I (1814) 19. — Ic.: Hoffm. l. c. tab. 2, f. 4.

145 Annual; root thin, fusiform; stem commonly solitary, 10–40 cm high, branching from base or only above, like leaves covered with stiff sparse spreading hairs; radical leaves ovate, on more or less long petioles passing into sheath, twice or four times pinnatisect, terminal lobes linear, mucronate, covered with sparse bristles; cauline leaves sessile on expanded sheaths. Umbels 3–10 cm across, of 3–6 rays, smooth or covered with sparse bristles; involucre usually 0; involucels of 5 narrowly lanceolate or oblong, ciliate leaflets, entire or with 2 terminal slits; petals white, notched or 2-lobed, the peripheral strongly elongated to 5–7 mm; fruit 4–5 cm long; beak 3–4 times as long as seed-bearing part, much flattened, marginal ribs with bristles, otherwise glabrous; styles erect, 1.5–2.5 mm long. June–July. (Plate X, Figure 1.)

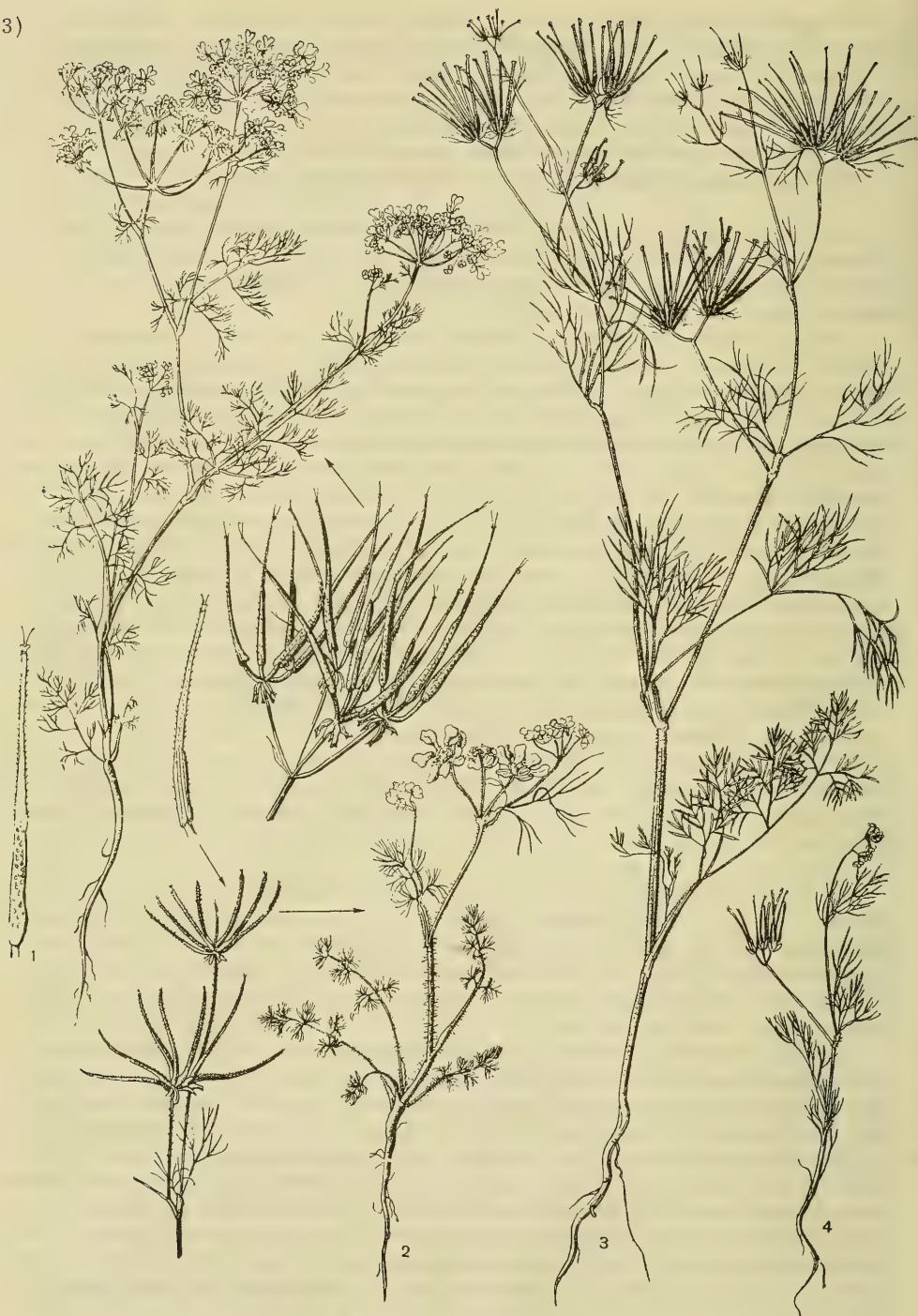


PLATE X. 1 - *Scandix iberica* M.B.; 2 - *S. falcata* Lond.; 3 - *S. stellata* Soland.; 4 - *S. aucheri* Boiss.

Stony slopes, fields, weedy places.— Caucasus: E. and S. Transc., Tal. Gen. distr.: As. Min., Arm.-Kurd., Iran. Described from Georgia. Type in Leningrad.

Economic importance. A weed of the third layer predominantly of spring crops.

Subgenus 2. *Wylia* (Hoffm.) Thell. in Hegi, *Illustr. Fl. d. Mitteleur.* V. 2 (1926) 1036.— Genus *Wylia* Hoffm. *Umbell.* I (1814) 3, ex p.— Beak very slightly compressed laterally, not sharply set-off from seed-bearing part of fruit, all ribs covered with bristles; styles 3–4 times as long as stylopodium; leaflets of involuclers entire, elliptic, with scarious margins; peripheral petals much expanded.

4. *S. falcata* Lond. in Mém. Soc. Nat. Mosc. I (1806) 57; Ldb. *Fl. Ross.* II, 345.— *S. apiculata* DC. *Prodr.* IV (1830) 221; Ldb. *Fl. Ross.* II, 346.— *S. australis* var. β M. B. *Fl. taur.-cauc.* I, app. (1808) 424; Ldb. *Fl. Ross.* II, 345, non L.; Shmal'g., *Fl. I.*, 421.— *S. grandiflora* Ldb. *Fl. Ross.* II, 346, non L.; Boiss. *Fl. or.* II, 917; Shmal'g., *ibid.* I, 421.— *S. taurica* Stev. in Bull. Soc. Nat. Mosc. XXIX (1856) 355.— *S. australis* subsp. *pontica* et subsp. *taurica* Vierh. in Verh. Zool.-bot. Ges. Wien (1914) 228–237.— *Wylia radians* Hoffm. *Umbell.* I (1814) 11.— Ic.: Londe, l. c. tab. V.

Annual; root thin, vertical; stem 6–30 cm high, in lower part more or less densely covered with long spreading hairs, glabrous and branching above, very rarely entire stem glabrous; radical and lower cauline leaves on long petioles dilated to sheath; blades ovate or oblong, 1–5 cm long, 0.5–3 cm wide, bipinnatisect or tripinnatisect, with narrowly linear acute lobules 1.5–6 mm long, ca. 0.5 mm wide, blades more or less densely covered with spreading hairs, rarely glabrous; upper leaves smaller, sessile on dilated sheath. Umbels of 2–5 rays, glabrous or with more or less dense spreading hairs; involucre 0; leaflets of involuclers 5–6, elliptic or broadly ovate, with broadly scarious margins, entire where
146 expanded, nearly equal to pedicels, becoming reflexed; petals white, the peripheral markedly expanded, 5–6 mm long; fruit 2.5–3 cm long, hairy all round, falcately curved when ripe; styles 1–1.3 mm long, erect or slightly ascending. Fl. April–May, Fr. May–July. (Plate X, Figure 2.)

Dry slopes, stony steppes, roadsides.— European part: Crim.; Caucasus: Cisc. (Taman Peninsula), W. Transc. (Novorossiisk, Anapa), E. Transc. (Baku, Divichi, Alyaty). Endemic. Described from the Crimea. Type in Moscow.

Note. This species is very close to *S. grandiflora* L., described after plants collected by Tournefort in the East, from which it can be distinguished only with difficulty. Its distribution area is isolated (Crimea, W. Ciscaucasia and Novorossiisk). Its presence in E. Transcaucasia (Baku, Divichi and Alyaty) may be due to its prevalence along railroad tracks. The original *S. grandiflora* L. grows much further south.

Subgenus 3. *Scandicium* C. Koch in Linnaea, XVI (1842) 363.— Section *Scandicium* Walpers, Repert. II (1843) 421.— Genus *Scandicium*

Thell. in Fedde, Repert. spec. nov. XVI (1919-1920) 15. — Beak slightly compressed laterally, not set-off from seed-bearing part of fruit, all ribs regularly covered with bristles; styles shorter than or as long as stylopodium; leaflets of involucre pinnate or entire, narrowly linear, almost without scarious margins; (peripheral) petals hardly expanded.

5. *S. stellata* Soland. in Russel. Aleppo, ed. 2, II (1794) 249. — *S. pin-natifida* Vent. Descr. pl. jard. Cels. (1800) 14; Ldb. Fl. Ross. II, 345; Boiss. Fl. or. II, 916; Shmal'g., Fl. I, 421; Grossg., Fl. Kavk. III, 131. — *S. russeliana* Griseb. Spicil. Fl. Rumel. I (1843) 369. — *S. pecten veneris* β *pinnatifida* Ces. Pass. et Gib. Comp. fl. Ital. (1881) 598. — *S. maniurkiana* Tamamsch. in Botan. Arch. (1932) 34. — *S. stellulata* (sphalm.) Tamamsch. in Fedde, Repert. spec. nov. XXXVIII (1935) 169. — *S. hispidula* Bertol. in Nov. Comm. Acad. Bologn. V (1862) 427. — *S. damascena* Bornm. in Fedde, Repert. spec. nov. X (1912) 468. — *S. fedtschenkoana* K.-Pol. in Izv. Bot. Sada, XVI (1916) 227; Kozo-Pol. in Fl. Az. Ross. XV, 59. — *S. pinnatifida* var. *hohenacker* Bess. ex Hohenacker in Bull. Soc.-Nat. Mosc. XI (1838) 326. — *S. pinnatifida* α *persica* (in nota) et β *songarica* Schrenk, Enum. pl. nov. (1841) 62. — *Chaerophyllum pinnatifidum* Poir. Encycl. V (1804) 144. — *Scandicium stellatum* Thell. in Fedde, Repert. sp. nov. XVI (1919) 18. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 206, f. 1; Soland, l. c. tab. 14; Fl. Az. Ross. XV, tabl. 6. — Exs.: Dörfler, Herb. norm. No. 3417; G. R. F. No. 2639. H. F. A. M. No. 315; Herb. Fl. Cauc. No. 89.

Annual; stems 10-30(40) cm high, branching above, covered with short spreading and long thin, slightly retrorse hairs, 1.5 mm long; leaves bi-
147 pinnate or tripinnate, 6 cm long, 3 cm wide, ovate, with dilated base, pubescent like stems; lobes of the last order linear, 3-10 mm long, 0.4-0.5 mm wide, short-haired, acute. Umbels of 1-3 rays; general involucre of many pinnate leaflets with linear, short, coarse hairy lobes; flowers subsessile on very short thickened pedicels; calyx-teeth inconspicuous; petals white; fruit subsessile or on very short thickened stalks, seed-bearing part cinammon-brown, covered with coarse white antrorse bristles; mericarps 20-30 mm long with distinctly protruding equal ribs, scarious, with small bristles; stylopodium flat-truncate; styles erect, very small, to 0.2 mm long, with capitate tip. (Plate X, Figure 3.)

Stony slopes, rock crevices, mountains to 2,300 m., weeds in fields. — European part: Crim. (only in Sudak district); Caucasus: Dag., E. and S. Transc., Tal.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh., Syr D., Amu D., Pam.-Al., Mtn. Turkm. Gen. distr.: W. and E. Med., Bal.-As. Min., Arm.-Kurd., Iran., Sinkiang. Described from near Aleppo. Type in London.

Note. The specimens from the Greater Balkhan Mountains described by Kozo-Polyanskii as *S. fedtschenkoana* certainly are *S. stellata*; the involucels of the type specimens have entire and pinnate leaflets and some authors (e.g. Hegi, Illustr. Fl. Mitteleur.) do in fact point out that in typical *S. stellata* entire leaflets of involucels occur alongside dissected ones. The specimens of *S. fedtschenkoana* are less pubescent than the type specimens and the leaf lobes are slightly wider. All these variations are evidently due to ecological conditions. Kozo-Polyanskii asks whether *S. fedtschenkoana* may not be a hybrid of *S. stellata*

and *S. aucheri*, as both occur together in the Greater Balkhan Mountains. The plants collected by Litvinov, also in the Greater Balkhan Mountains, resemble Kozo-Polyanskii's specimens, but are more sparingly pubescent and (in fact appear) identical with *S. stellata*.

6. *S. aucheri* Boiss. in Ann. sc. Nat. 3 sér. II (1844) 58; Fl. or. II, 916; Grossg., Fl. Kavk. III, 131. — *Scandicium stellatum* var. *aucheri* Thell. in Fedde, Repert. spec. nov. XVI (1919) 18. — *S. aucheri* Manden. in Not. system. ac geograph. Inst. bot. Tphilisiens. 10 (1941) 74.

Annual; root thin; stems branching above, sometimes from base, 5–15 cm high, erect or ascending, very short, often nearly velutinous-hairy in lower half; radical leaves early withering; lower cauline leaves on more or
148 less long petioles passing into oblong, amplexicaul, short-haired sheath; blades broadly ovate or oblong, 1.5–3 cm long, 0.7–1.5 cm wide, bipinnatisect or tripinnatisect, more or less densely covered with spreading hairs; terminal lobes narrowly linear, 2–5 mm long, ca. 0.5 mm wide, acute; upper leaves smaller and less dissected. Umbels commonly of 2 short, 2–4 mm long rays with short spreading hairs; involucre 0; involucels of 3–5 linear acute hairy leaflets as long as umbel; petals white or pink, obcordate, 1–1.5 mm long; fruit subsessile, grayish-hairy all round, ca. 1.5 cm long, with slightly falcately curved tip; styles very short (0.1–0.2 mm). April–May. (Plate X, Figure 4.)

Stony slopes, Central Asian juniper woodland, rock crevices, to 1,100 m. — Caucasus: S. Transc. (Nakhichevan ASSR); Centr. Asia: Mtn. Turkm. (Kopet-Dagh, Greater Balkhan Mountains). Gen. distr.: Arm.-Kurd., Iran. Described from Iran (Isfahan). Type in Geneva.

Genus 954. **OSMORHIZA** * Rafin.

Rafin. Amer. Mont. Magaz. II (1818) 176. — *Washingtonia* Rafin. l.c. (1818) nom nud. — Kozo-Pol. in Fl. Az. Ross. XV (1920) 48. — *Uraspermum* Nutt. Gen. N. Amer. pl. I (1818) 192, non Scop. — *Spermatura* Rchb. Conspect. (1828) 141. — *Schudia* Mol. in Gay, Cl. Hist. física y política de Chile, III (1847) 143. — *Washingtonia* subgen. *Osmorrhiza* C. et K. Contrib. Unit. St. Nation. Herb. VII, 1 (1900) 61. — *Scandix* subgen. *Uraspermum* K.-Pol. in Bull. Soc. Natur. Mosc. XXIX (1915) 142.

Calyx-teeth inconspicuous; petals white, obovate, notched with inward curved ligule; fruit linear-oblong, slightly compressed laterally, ribs bearing thin antrorse and nearly appressed bristles; stylopodium conical; styles erect or slightly ascending, nearly as long and as wide as fruit; mericarps subcircular in cross section or 5-faceted; ribs protruding; valliculae broad; canals 3 per vallicula, 4–6 at commissure, soon becoming obliterated; albumen in cross section horseshoe-shaped, with deep furrow turned towards commissure; carpophore 2-partite only at tip. Perennial herbs, with ternately pinnate leaves and large few-rayed spreading umbels.

Up to 11 species in N. America, in the S. American Andes, Himalayas, Far East, Kuznetsk Ala-Tau, and in the Caucasus.

* From the Greek *osme* — aroma, and *rhiza* — root; referring to the aroma of the root, whether fresh or dried.

- 149 1. *O. aristata* (Thunb.) Mak. et Yabe, Bot. Mag. Tokyo, XVII (1903) 14; Constance a. Shan, The Gen. Osmorhiza (1948) 127. — *O. japonica* Sieb. et Zucc. Abh. Akad. Münch. IV, 2 (1843) 203. — *O. amurensis* Fr. Schmidt ex Maxim. Prim. Fl. amur. (1859) 129; Kom., Fl. Man'chzh. III, 132; Kryl., Fl. Zap. Sib. VIII, 2030; Grossg., Fl. Kavk. 133. — *O. aristata* var. *montana* Makino, Journ. Jap. Bot. II (1918) 7. — *O. montana* Makino, Journ. Jap. Bot. V (1928) 28. — *Chaerophyllum aristatum* Thunb. Fl. jap. (1784) 119; DC. Prodr. IV, 228. — *Myrrhis aristata* Spreng. Umbell. (1813) 133. — *Uraspermum aristatum* Kuntze, Rev. Gen. I (1891) 270. — *Scandix claytonii* K.-Pol. in Bull. Soc. Nat. Mosc. XXIX (1915) 143, ex p. — *S. aristata* K.-Pol. l.c. (1915). — *S. amurensis* K.-Pol. l.c. (1915). — *Washingtonia claytonii* K.-Pol. in Fl. Az. Ross. XV (1920) 50, non *Myrrhis claytoni* Michx. (1803). — *W. amurensis* K.-Pol., ibid., in synonym. — Ic.: Kom. and Alis., Oprod. rast. Dal'nevost. kr. tabl. 243.

Perennial; root thick, with agreeable aroma; stems simple or few-branched, 30–80 cm high, cylindrical, thin-sulcate, with glabrous or hairy nodes; leaves broadly triangular, thin, bright green, paler beneath, with sparse appressed stiff hairs on both sides especially on nerves; lower leaves on long, upper on shorter, hairy petioles, dilated to sheath with scarious margins; blade 10–25 cm long, nearly as wide, ternate at base, primary lobes long-petioled, pinnate, the secondary more or less deeply pinnatisect into ovate or ovate-oblong, acute, or entire dentate lobules with truncate base, 1–2 cm long, 0.5–1 cm wide. Umbels large in fruit, 10–25 cm across, solitary or 2–3 on long peduncles, of 3–8, long, widely divergent, irregular rays; involucre 0 or 1, of 1–5 small caducous leaflets; umbellets with 3–10 flowers, of which 2–4 fertile, their rays elongating in fruit; involucels with 3–6 lanceolate-linear or linear acute green leaflets becoming reflexed; fruit 18–25 mm long, ca. 2 mm wide, lower tail-like tapering part nearly equal to rest of fruit; stylopodium conical, tapering to filiform, erect or divergent style as long as stylopodium (with it 1–2 mm long). July–August.

Conifer, broadleaved and mixed mountain forests. — Caucasus: Cisc. (Kuban); W. Siberia: Alt. (Sinyukha, Kuznetsk Ala-Tau); Far East: Ze.-Bu., Uss., Sakh. Gen. distr.: Jap.-Manchuria. Described from Japan. Type in Uppsala.

- 150 Note. This plant is remarkable for its fragmented distribution area: Caucasus (Kuban), Altai (Sinyukha, Kuznetsk Ala-Tau), Far East and Japan. Judging from the tags at the herbarium of the Botanical Institute of the Academy of Sciences of the USSR, some Soviet botanists have attempted to distinguish within the USSR 3 subspecies or 3 varieties to correspond to the geographical distribution. But careful study of available material did not support such a separation. In any event, *Osmorhiza aristata* must be regarded as an ancient relict.

Genus 955. **MYRRHIS*** Mill.

Mill. Gard. Dict. ed.4 (1754), Cfr: Druce in Rep. Bot. Exch. Cl. Brit. Isl.III (1913) 733.— *Lindera* Aschers. in Verh. Bot. Ver. Prov. Brand. Bd.VI (1864) 183, non Adans.

Calyx-teeth inconspicuous; petals white, notched, with inward turned lobe in notch, outer petals of umbels expanded; fruit oblong-pyramidal, slightly compressed laterally, scabrous, with antrorse hairs sessile on tubercles; mericarps in cross section like a 5-rayed star with 5 equal acute ribs with triangular base; marginal ribs of both mericarps firmly appressed; canals in young fruit numerous, canals of various sizes occurring in the inner part of the mesocarp; in addition, solitary canals occur in ribs, outside the vascular-fibrous bundle, but become obliterated on ripening; stylopodium conical; styles suberect, twice as long as stylopodium; albumen with deep incision at commissure. Perennial herbs, with bi- and quadripinnate leaves.

Monotypic genus, in mountains of Europe, widely cultivated.

1. *M. odorata* (L.) Scop. Fl. carn. ed.2, I (1772) 207; Ldb. Fl. Ross. II, 354; Boiss. Fl. or. II, 910; Shmal'g., Fl. I, 425; Grossg., Fl. Kavk. III, 133.— *Scandix odorata* L. Sp. pl. (1753) 257.— *Chaerophyllum odoratum* Crantz, Cl. Umbell. Emend. (1767) 75.— *Lindera odorata* Asch. l.c. (1864) 185.— *Selinum myrrhis* E.H.L. Krause in Sturm. Fl. Deutschl. ed.2, XII (1904) 68.— Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 2013 (1866).

151 Perennial; root thick, nodose, dark brown, multicipital; stem erect, 50–120 cm high, cylindrical, thinly ribbed, hollow inside, branching above, glabrous or slightly pubescent, nodes and sheaths of leaves always covered with rather long, thin, often retrorse hairs; leaves triangular, 2–4 times pinnatisect, the lower long-petioled, lobes acuminate, those of the first order oblong-ovate, of the second order ovate; lobules of the last order ovate-oblong or lanceolate, dentate, covered with short soft hairs beneath; upper leaves small, less dissected. Umbels of 8–10 rays; involucre 0; pedicels of bisexual flowers hairy, of staminate flowers glabrous; leaflets of involuclers 5–7, lanceolate, acuminate, almost scarious, ciliate; flowers in terminal polygamous umbels, bisexual with few staminate flowers, lateral umbels mostly staminate; calyx-teeth inconspicuous; petals white, notched, acuminate tip curved inward, peripheral petals slightly expanded, to 3 mm long; fruit 2–2.5 cm long. May–July.

Reported for some localities but obviously only escaped from cultivation, not wild in the USSR, in meadows and along forest edges.— European part: Balt. (Ezel Island and Moon), U. Dns. (Bukovina, Carpathian Mountains); Caucasus: Cisc. Gen. distr.: mountains of W. Europe (Pyrenees, Alps, Apennines), in other parts of Europe cultivated or escaped. Described from the European Alps. Type in London.

Economic importance. Sometimes grown for its pleasant odor reminiscent of anise. Also used as a spice.

* From Dioscorides' Greek name *myrrhis*. Pliny's *myrris* may indeed be identical with this. Its pleasant aroma has over many years led to it being substituted for myrrh from Arabia and Ethiopia, obtained from the locally escaped *Commiphora abyssinica* (Berg.) Engl. (family Burseraceae).

Genus 956.* **ALBERTIA** ** Rgl. et Schm.

Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 603.—Kozlovia Lipsky, ibid XXIII (1904) 147

152 Flowers unisexual-bisexual, calyx edentate, petals white, irregular, the peripheral twice as large as the others, obovate or broadly ovate, notched, with short inward curved tip, crumpled-hairy margin, the inner ovate, nearly flat; stylopodium flat, dilated, with acute margin, distinctly contracted at base; styles erect, elongate; fruit laterally compressed, oblong-ovoid, with stiff bristles sessile on excrescences along ribs; mericarps dorsally compressed in cross section, with sharply protruding ribs; resin canals absent; pericarp thin, coriaceous; mesocarp of outer small-celled parenchymatous layer and single inner layer of transversely elongated cells, inner side of seeds deeply notched. Perennial plants, with tubers deep in the ground.

The taxonomic position of this monotypic genus is ambiguous as there are no similar types. Some authors relate it to *Silva* Besser (K.-Pol. in Vestn. Tifl. Bot. Sada, III–IV (1915) 147/9).

1. *A. paleacea* Rgl. et Schm. l.c. 608; K.-Pol. l.c. 147.—Kozlovia *paleacea* Lipsky in Tr. Bot. Sada, XXIII (1904) 147.—Ic.: K.-Pol., ibid., table 6 (p. 149).

Perennial or biennial; softly pubescent, yellowish-green plant; tuber globose, ca. 20 mm across; stem solitary, 30–60 cm high, its base enveloped by remnants of leaves, hollow, thinly sulcate, simple or with 1–3 branches in upper part; leaves soon withering, the radical solitary, long-petiolate, with broadly rhombic blades to 10 cm long, ternate, its segments pinnatisect into few equal elliptic to rounded lobate segments, 2–3 cm long; cauline leaves with reduced petioles, sheaths narrow, dilated toward apex with scarious-pubescent margins, their blades smaller, the terminal segments slightly narrower; blade of upper leaves strongly reduced. Umbels of 15–20, unequal, 4–7 cm long, spreading, grooved smooth rays; involucre 0; umbels 15–20-flowered, involucels 0 or of 5–6 oblong membranous deciduous leaflets; central flowers of umbels staminate, the outer bisexual; peripheral petals 3 mm long, the others 1.5–2 mm long; style 2 mm long; fruit 5 mm long, $\frac{1}{2}$ to $\frac{2}{3}$ the length of the pedicels, distinctly tapering towards apex; ribs acutely protruding, valliculae acute, covered with verrucae, sometimes with bristly papillae. April–May. (Plate XV, Figure 4.)

Fallows, fields, very rarely in cover steppes of couch-grass mixed with herbs, confined to gentle foothills.—Centr. Asia: T. Sh. (Kuraminskii Range), Pam.-Al. (Turkestan Range, western spur of Gissar Range, Kugitang), Mtn. Turkm. (Kushka). Endemic. Described from Zeravshan River valley (between Yarbash and Dzhiman and Karasu and Katty-Kurgan). Type in Leningrad.

* Treatment by E.P. Korovin.

** After Albert Regel, a student of the flora of Central Asia.

153 Genus 957. **TORILIS** * Adans.

Adans. Fam.II (1763) 99 p.p. emend. Rchb. fil. Ic. Fl. Germ.XXI (1866) 82.— *Caucalis* Sect.IV, *Torilis* Čelak. Botan. Zeit.XXXI (1873) 43.— *Daucus* Sect.8, *Torilis* Baill. Histoire des plantes, VII (1880) 90.— *Dasyspermum* Necker, Elem.I (1790) 295.— *Anthriscus* Bernh. Syst. Verz. Erf. (1800) 113, nec Pers. (1805), nec Hoffm. (1814).— *Daucalis* Pomel, Nouv. Mat. Fl. Atl. (1874) 148.— *Lappularia* Pomel, l.c. (1874) 149.

Flowers bisexual or in part staminate; calyx-teeth triangular-lanceolate, acute, difficult to distinguish from the similar spines of the fruit; petals white or reddish, the peripheral slightly expanded, broadly obcordate, deeply notched, with incurved tip, dorsally with appressed bristles in middle part; fruit ovoid or oblong-cylindrical, slightly compressed at sides, mericarps dorsally inflated, with groove at commissure; main ribs thin, obscurely separated from valleculae, with 1 row of antrorse bristles; valleculae with faintly protruding accessory ribs; canals solitary under valleculae, 2 at commissure; stylopodium short-conical; style shorter or a few times as long as the stylopodium; carpophore cleft for $\frac{1}{3}$ to $\frac{1}{2}$; albumen at commissure with deep furrow, nearly crescent-shaped in cross section. Annual herbs, covered with appressed bristles, with bi- or tripinnate leaves.

About 15 species, in Europe, Asia and N. Africa.

- 1. Involucre of 4–6 leaflets 2.
- + Involucre of 1–2 leaflets or absent 3.
- 2. Fruit 2 mm long; umbels of 10–15 rays; peripheral petals to 2 mm long; style 5 times as long as stylopodium ... 2. *T. ucrainica* Spreng.
- + Fruit 3 mm long; umbels of 5–12 rays; peripheral petals ca. 1 mm long; style slightly longer or 2 times as long as stylopodium 1. *T. japonica* (Houtt.) DC.
- 3. Umbels opposite leaves, sessile or on 0.5–5 cm long peduncles 4.
- + Umbels terminal, peduncles 5–10 cm long 6.
- 4. Fruits 2–3 mm long, strongly heteromorphous, the central mericarps covered with tubercles, the outer with long prickles; umbels subsessile 7. *T. nodosa* (L.) Gaertn.
- 154 + Fruits 5–6 mm long, equal; peduncles 1–5 cm long 5.
- 5. Petals long persistent; prickles of fruits yellow (Crimea) 9. *T. xanthotricha* (Stev.) Schischk.
- + Petals caducous; prickles of fruits never yellow 8. *T. leptophylla* (L.) Rchb.
- 6. Umbels usually of 2–3(4) rays; peripheral petals not expanded, ca. 1 mm long; style slightly longer than stylopodium; spines of fruit suberect, acicular 5. *T. heterophylla* Guss.
- + Umbels of 4–12 rays; peripheral petals usually expanded, exceeding 1 mm; style 2–6 times as long as stylopodium; spines of fruit curved upward 7.
- 7. Fruit linear, ca. 1 mm wide; prickles on secondary ribs 3 times as long as the diameter of the mericarps ... 6. *T. tenella* (Del.) Rchb. fil.
- + Fruit ovoid, 1.5–2.5 mm wide; prickles on secondary ribs equal to diameter of mericarp 8.
- 8. Peripheral petals expanded, exceeding 2 mm; style 3–6 times as long as stylopodium 4. *T. radiata* Moench.

* Adanson presumably made up this name without any particular meaning, though it may be related to *Tordylium*.

- + Peripheral petals expanded, not exceeding 1.5 mm; style not more than 2-4 times as long as stylopodium 3. *T. arvensis* (Huds.) Link.

Subgenus 1. *Eu-Torilis* (DC.) Drude in E.-P. Pflanzenfam. III, 7-8 (1898) 156. — Sect. *Eu-torilis* DC. Prodr. IV (1830) 218. — Main ribs hardly protruding, with rows of thin white antrorse bristles, not sharply set off from valliculae, secondary ribs above valliculae well developed, broad, slightly protruding, with irregularly arranged spines or tubercles; ignoring the spines, when viewed laterally the fruit appears ovoid, 4-5 mm long; canals distinctly visible in cross section, transversely elliptic, carpophore splitting to $\frac{1}{3}$ or to middle.

Section 1. *ANTHRISCARIA* Thellung in Hegi, III. Fl. Mitteleur. V, 2 (1926) 1051. — Leaflets of involucre 4-6, appressed to rays; under strong magnification spines of fruit appear scabrous, with remote acute teeth, curved above, and tapering to straight or slightly bent acute smooth tip; styles glabrous; furrow at commissure oblong; canals close to surface and distinctly visible; stylopodium thin, subfiliform; albumen with shallow furrow, crescent-shaped in cross section, with margin perpendicular to surface of commissure.

1. *T. japonica* (Houtt.) DC. Prodr. IV (1830) 219. — *T. rubella* Moench, Meth. (1794) 103. — *T. stricta* Wibel, Prim. Fl. Werth. (1793) 155 192. — *T. anthriscus* Gmel. Fl. Bad. I (1805) 168, non Gaertn. (1788), nec Bernh. (1800); Ldb. Fl. Ross. II, 234; Boiss. Fl. or. II, 1081; Grossg., Fl. Kavk. III, 133. — *T. elata* Spreng. Syst. IV. Cur. post. (1827) 119. — *T. scabra* DC. Prodr. IV (1830) 219. — *T. persica* Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 102. — *T. praetermissa* Hance in Ann. Sc. Nat. sér. 5, V (1866) 214. — *T. convexa* Dulac, Fl. des Haut.-Pyrén. (1867) 361. — *T. anthriscus* var. *japonica* De Boisseau in Bull. Soc. Bot. Fr. LIII (1906) 437. — *T. anthriscus* subsp. *eu-anthriscus* Thell. in Hegi, Illustr. Fl. Mitteleur. V, 2 (1926) 1053. — *Tordylium anthriscus* L. Sp. pl. (1753) 243. — *T. asperum* Gilib. Fl. Lithuan. II (1782) 11. — *T. verecundum* Salisb. Prodr. (1796) 160. — *Caucalis japonica* Houtt. Nat. Hist. XXVI (1777) 42. — *C. anthriscus* Huds. Fl. Angl. (1762) 99; Shmal'g., Fl. I, 419. — *C. aspera* Lam. Fl. Fr. III (1778) 424, nom. illeg. — *Chaerophyllum scabrum* Thunb. Fl. Jap. (1784) 119. — *Ch. hispidum* Thunb. ex Miq. Ann. Mus. Bot. Ludg. Bat. III (1867) 64. — *Daucus anthriscus* Baill. Hist. pl. VII (1880) 88. — *Selinum torilis* E. H. L. Krause in Sturm, Deutschl. Fl. ed. 2, XII (1904) 155. — Ic.: Syreishchikov, Ill. Fl. Mosk. Gub. II, 422. — Exs.: G. R. F. No. 818; Fl. polon. exs. No. 826 (sub *T. rubella* Moench).

Annual or biennial; root fusiform, mostly simple; stems 40-100 cm high, branching nearly from base, thinly ribbed, scabrous from short appressed retrorse hairs, leaves oblong-ovate, bi- or tripinnatisect, covered with appressed antrorse bristly hairs; lobes of the last order ovate-oblong, pinnatifid at base, dentate above, with ovate or oblong, obtuse, dentate lobules; uppermost leaves less dissected, often only trifid. Umbels

2-4 cm across, on long peduncles, of 5-12 rays densely covered with appressed bristles; involucre of 5 linear-subulate appressed-bristly leaflets; leaflets of involucre numerous, subulate, bristly-hairy, nearly as long as umbels. Flowers partly bisexual, partly staminate; petals white or pink-violet, outside greenish, and covered with appressed hairs, broadly obovate, with deep narrow notch and incurved tip; fruit ovoid, 2-3 mm long; prickles on secondary ribs long, as long as mericarp is wide, scabrous from remote acute teeth visible only under high magnification; styles longer than stylopodium, smooth, glabrous, erect in flower, later recurved. June-July.

156 Groves, shrubby formations, pine forests, thinned-out spruce forests, aspen forests, felled forest areas, roadsides. - European part: Lad.-Ilm., U. V., V.-Kama, Balt., U. Dnp., M. Dnp., V.-Don, U. Dns., Bes., Bl., Crim., L. Don, Transv.; Caucasus: Cisc., W., E. and S. Transc.; Far East: Uss. Gen. distr.: Centr. and Atl. Eur., W. and E. Med., Bal.-As. Min., introduced in N. Am., S. Asia and Jap.-Ch. Described from Japan. Type in Paris.

Note. Careful study of numerous specimens of *T. japonica* (Houtt.) DC. from Japan and China, in the Herbarium of the V. L. Komarov Botanical Institute of the Academy of Sciences of the USSR, did not reveal any differences between this species and *T. anthriscus* (L.) Gmel., yet this name is invalid as Gaertner had earlier used it for another plant, *Anthriscus vulgaris*. *T. japonica* (Houtt.) DC. has priority and we are therefore substituting it for the accepted *T. anthriscus* (L.) Gmel.

Economic importance. An occasional weed along borders of fields.

2. *T. ucrainica* Spreng. in Schult. Syst. VI (1820) 485. - *T. microcarpa* Bess. Enum. pl. Volhyn. (1822) 43. - *T. macrocarpa* (erron.) C. Melv. in Journ. of Bot. (1924) 242. - *T. anthriscus* subsp. (?) *ucrainica* Thell. in Hegi, Illustr. Fl. Mitteleur. V, 2 (1926) 105. - *Caucalis microcarpa* Schmalh. Fl. I (1895) 419; E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 156, nec Hook. et Arn. - *Daucus microcarpus* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 156. - Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 205i.

Annual; root fusiform; stem erect, branching from base, 30-120 cm high, thinly sulcate, scabrous from short retrorse appressed hairs; leaves oblong-ovate, bi- or tripinnate, scabrous from short antrorse hairs; lobes of last order linear or linear-lanceolate, gradually tapering at both ends, thin-acuminate, usually entire; uppermost leaves smaller, not as dissected. Umbels of 10-15 rays densely beset with appressed antrorse bristles; involucre mostly of 5 linear-subulate membranous leaflets, with short bristles along margins; involucre of numerous subulate bristly-hairy leaflets, as long as rays; petals white, the peripheral to 2 mm long, broadly obovate, with narrow deep notch and incurved tip; fruit ovoid, 2 mm long, their prickles scabrous from remote acute antrorse crenations; styles 5 times as long as stylopodium. June-July. (Plate XI, Figure 3.)

159 Shrubby formations, oak groves, southern slopes, near cliffs. - European part: U. Dnp., Bl., L. Don, Bess. Endemic. Described from the Ukraine. Type in Vienna.



PLATE XI. 1 - *Torilis leptophylla* (L.) Rchb.; 2 - *T. heterophylla* Guss.; 3 - *T. ucrainica* Spreng.

Section 2. LAPPULARIA (Pomel) Thell. in Hegi, Ill. Fl. Mitteleur. V, 2 (1926) 1051. — Genus *Lappularia* Pomel, Nouv. Mat. Fl. Atl. (1874) 149. — Leaflets of involucre 0 or 1(2); spines of fruit slightly antrorse or suberect, obtuse, tipped by a crown of teeth, scabrous from slightly retrorse acute teeth; surface of commissure linear, canals in furrow under bundles of sclerenchymatous fibers (stereomas) of lateral main ribs, covered, not visible from the outside; carpophore thicker than in section *Anthriscaria* Thell.; albumen with deep furrow, reniform in cross section, with inward turned edges.

3. *T. arvensis* (Huds.) Link, Enum. Horti berol. I (1821) 265; Bess. Enum. pl. Volhyn. (1822) 12. — *T. divaricata* Moench, Meth. Suppl. (1802) 34. — *T. arvensis* subsp. *divaricata* Thell. in Hegi, Illustr. Fl. Mitteleur. V, 2 (1926) 1055. — *T. helvetica* Gmel. Fl. Bad. I (1805) 617; Ldb. Fl. Ross. II, 343. — *T. infesta* Clairv. Man. d'herborisat. (1811) 78; Hoffm. Umbell. ed. 1 (1814) 53; Boiss. Fl. or. II, 1082. — *Caucalis arvensis* Huds. Fl. Angl. ed. 1 (1762) 98. — *C. helvetica* Jacq. Hort. Vindob. III (1776) 12. — *C. segetum* Thuill. Fl. Par. ed. 2 (1799) 136. — *C. purpurea* Ten. Fl. Nap. Atlas, III (1811–1838) tab. 131. — *C. infesta* Curtis Fl. Londin. II, fasc. VI (1821) tab. 23; Shmal'g., Fl. I, 420. — *C. segetalis* Steud. Nomencl. ed. 2, I (1840) 312. — *Scandix infesta* L. Syst. ed. 3, II (1767) 732. — *Anthriscus arvensis* K.-Pol. in Izv. Mosk. obshch. Ispyt. Prir. Nov. ser. XXIX (1915) 151; Fl. Az. Ross. XV (1920) 95, ex p. — Ic.: Jacq. Hort. Vindob. tab. 16; Rchb. Ic. Fl. Germ. XXI, tab. 166, f. I, II. — Exs.: G. R. F. No. 1770 et 2469; H. F. A. M. No. 27; P. sintenis, It. trans.-pers. No. 498, a, c, No. 630 c.

Annual; root thin, fusiform; stem erect, 30–100 cm high, like leaves and umbel rays covered with short bristly hairs, thinly sulcate, usually branching from base; leaves triangular-ovate or triangular-oblong, the lower bi- or tripinnate, the upper often only pinnate; lobes of the last order acutely dentate. Umbels long-stalked, of 2–10 rays; involucre 0 or of 1–2 unequal leaflets; leaflets of involucels numerous, linear-subulate; petals white or reddish, obcordate, with deep narrow notch and inward curved tip, the peripheral slightly expanded, ca. 1.5 mm long; style bristly-hairy at base, 2–3 times as long as stylopodium; fruit 3–5 mm long; 160 prickles on fruit as long as mericarp is wide, straight or curved above, with small retrorse crenations and a terminal crown of hooks.

Along ditches, irrigation ditches, gardens, shrubby formations, forest edges. — European part: Bes., Bl., U. Dns., L. V., Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc.; Centr. Asia: T. Sh., Syr D., Pam.-Al., Mtn. Turkm. Gen. distr.: Med., Centr. and Atl. Eur., Afr., Iran., E. As. Introduced into N. Am. and Australia. Described from England. Type in London.

Note. An occasional weed of crops.

4. *T. radiata* Moench, Meth. (1794) 103. — *T. neglecta* Schult. Syst. Veg. VI (1820) 484; DC. Prodr. IV, 218; Ldb. Fl. Ross. II, 343; Boiss. Fl. or. II, 1083; Grossg., Fl. Kavk. III, 132. — *T. chlorocarpa* Spreng. Syst. I (1825) 898. — *T. infesta* Roth, Enum. Pl. phaner. Germ. I (1827) 901. — *T. syriaca* Boiss. et Blanche in Boiss. Diagn. ser. 2, II (1856) 98. —

T. arvensis subsp. *neglecta* Thell. in Hegi, Ill. Fl. Mitteleur. V, 2 (1926) 1055. — *Scandix infesta* Jacq. Austr. tab. 46 (1773), non L. — *Lappularia neglecta* Pomel, Nouv. Mat. Fl. Atl. (1874) 150. — *Caucalis neglecta* Schmalh. Fl. I (1895) 420. — *Daucus infestus* Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 156. — Ic.: Jacq. l. c. tab. 46 (sub *Sc. infesta*).

Annual; root thin, fusiform; stem erect, 30–100 cm high, like leaves covered with short bristly hairs, thinly sulcate, usually branching from base; leaves triangular-ovate or triangular-oblong, the lower bi- or tri-pinnatisect, the upper often only pinnate; lobes of the last order long-acuminate, acutely dentate. Umbels long-stalked, of 3–7 rays; involucre 0 or of 1–2 unequal leaflets; involucels of numerous linear-subulate leaflets; petals white, obcordate, with deep notch and inward curved tip, the peripheral markedly expanded, exceeding 2 mm; style bristly-hairy at base, 3–6 times as long as stylopodium; fruit 3–6 mm long, prickles on secondary ribs as long as mericarp is wide, scabrous from retrorse crenations, with subterminal crown of hamate prickles. May–June.

Shrubby slopes. — European part: Crim.? Caucasus.? W. and E. Transc. Gen. distr.: W. and E. Med., Bal.-As. Min., Iran. Described from Austria. Type was in Germany.

Note. There are no herbarium specimens to substantiate records of this species from the Crimea and Transcaucasia.

5. *T. heterophylla* Guss. Prodr. Fl. Sicul. I (1827) 326; Ldb. Fl. Ross. 161 II 344; Boiss. Fl. or. II, 1082. — *T. heterosperma* Stev. in Bull. Soc. Nat. Mosc. (1856) 263 sphalm. pro *T. heterophylla* Guss. — *T. helvetica* var. *pauciradiata* Trautv. in Tr. Bot. Sada, I (1871) 33. — *T. neglecta* var. *pauciradiata* Grossh., Fl. Kavk. III (1932) 132. — *T. infesta* var. *heterophylla* Rchb. Ic. Fl. Germ. XXI (1866) tab. 2008. — *Caucalis heterophylla* Schmalh. Fl. I (1895) 419. — Ic.: Rchb. l. c. tab. 2008.

Annual; root thin fusiform; stem erect, 30–100 cm high, thinly sulcate, usually branching from base, like leaves covered with short bristly hairs; lower leaves bipinnatisect, with oblong pinnatifid serrate lobes; median leaves ternate-dissected, with narrowly lanceolate serrate lobes; uppermost leaves linear, entire or remotely dentate. Umbels on long peduncles, of 2–3 rays covered with appressed bristles; involucre 0 or 1–2-leaved; leaflets of involucels numerous, linear-acuminate; petals white or reddish, with narrow notch and inward curved tip, dorsally pubescent; style bristly-hairy at base; fruit 3–5 mm long, nearly always heteromorphic, with typically developed spines confined to mericarps turned outwards. June–July. (Plate XI, Figure 2.)

Roadsides, dry slopes, clearings in dry forests. — European part: Crim. (southern shore); Caucasus: Cisc., Dag., E. and W. Transc., Tal. Gen. distr.: Med., Bal.-As. Min. Described from Sicily. Type in Naples.

6. *T. tenella* (Del.) Rchb. fil. Ic. Fl. germ. XXI (1866) tab. 74. — *Caucalis tenella* Del. Fl. Eg. (1813) 58; Boiss. Fl. or. II, 1084; Trautf. in Tr. Bot. Sada, I, 1 (1871) 19; Grossg., Fl. Kavk. III, 136. — Ic.: Delil, l. c. tab. 21, f. 3; Rchb. l. c. tab. 74.

Annual; root thin; stem 20–25 cm high, branching from base with oblique branches, like leaves covered with very short scattered, appressed or slightly spreading, retrorse white bristles; leaves ovate, 3–5 cm long, 1.5–2 cm wide, tripinnatisect, the lower petioled, the upper sessile on oblong sheath; terminal lobes linear, 2–4 mm long, 0.5 mm wide, terminating in short bristle. Umbels of 4–9 unequal rays covered with scattered semi-appressed bristles; involucre 0; umbellets few-flowered, ca. 4–5 mm across; involucels of 4–5 linear hairy leaflets; calyx-teeth persistent, lanceolate, petals white; fruit linear, 3.5–5 mm long, ca. 1 mm wide; secondary ribs with 1 row of scabrous prickles, 3 times as long as mericarps are wide; style very short. May.

162 Dry places. — Caucasus: E. Transc. (Mugan). Gen. distr.: Bal.-As. Min., Iran. (NE), Afr. Described from Egypt. Type in Montpellier (?).

7. *T. nodosa* (L.) Gaertn. De Fruct. I (1788) 82; Ldb. Fl. Ross. II, 344; Boiss. Fl. or. II, 1083; Grossg., Fl. Kavk. III, 134. — *T. nodiflora* Bub. Fl. Pyren. II (1900) 406. — *T. stocksiana* K.-Pol. in Tr. Peterb. Bot. Sada, XXXVI (1920) 98, non *Caucalis stocksiana* Boiss. (1859); Grossg. Fl. Kavk. III (1932) 134. — *Tordylium nodosum* L. Sp. pl. (1753) 240. — *Caucalis nodosa* Crantz, Class. Umbellif. (1767) 109; Shmal'g., Fl. I, 420. — *C. nodiflora* Lam. Fl. Fr. III (1778) 424. — *Lappularia nodosa* Pomel, Nouv. Mat. Fl. Atl. (1874) 150. — *Daucus nodosa* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 137. — *Anthriscus stocksiana* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 151. — *A. nodiflora* K.-Pol. l. c. (1915); Fl. Az. Ross. XV (1920) 98. — *A. leptophylla* β *stocksiana* K.-Pol. Fl. Az. Ross. XV (1920) 97. — Ic.: Gaertn. l. c. tab. 20, f. 6.

Annual; root thin, fusiform; stems 10–35 cm high, solitary or few, erect, ascending or spreading close to ground, cylindrical, thinly sulcate, scabrous from retrorse bristly hairs; leaves and petioles covered with short antrorse bristly hairs; the lower leaves on short petioles, abruptly tapering to short, dilated sheath with whitish-scarious margins, twice or four times pinnate; the upper sessile on narrow oblong sheaths; lobes of the last order oblong, acute or acuminate, deeply pinnatifid, with linear-lanceolate or linear lobules, 1–2 mm wide, mucronate, entire or obscurely dentate. Umbels at first apparently terminal but very soon shifting to lateral side owing to strong growth of lateral shoot, subsessile in flower, becoming short-stalked, rays 2–3, like pedicels very short; involucre 0; leaflets of involucels subulate, shorter than umbel rays; all flowers bisexual, fertile; petals white, ca. 0.5 mm long, shallowly notched, dorsally pubescent; fruit ovoid, 2–3 mm long, heteromorphous, the outer mericarps with normally developed, erect acicular crenations with terminal whorl of hamate prickles, the inner covered with obtuse tubercles; style glabrous, erect, very short. April–June.

Shrubby formations, stony slopes, vineyards and crops. — European part: Crim.; Caucasus: Dag., W., E. and S. Transc.; Centr. Asia: Mtn. Turkm., Amu D., Pam.-Al. Gen. distr.: Atl. and Centr. Eur., W. and E. Med., Bal.-As. Min., Iran, introduced in the southern part of the U. S. A. Described from France and Italy. Type in London.

- 163 Subgenus 2. *Daucalis* (Pomel) Schischk. — Gen. *Daucalis* Pomel, *Nouv. Mat. Fl. Atl.* (1874) 148. — Subgen. *Pseudo-caucalis* Drude in *E.-P. Pflanzenfam.* III, 8 (1898) 156. — Main ribs separated from the secondary ribs on side by furrow; secondary ribs with spines arranged in 2–3 regular rows; fruit (ignoring spines) elongate-prismatic, 5–6 mm long; canals narrow; carpophore split only at summit.

8. *T.leptophylla* (L.) Rchb. Ic. Fl. Germ. XXI (1866) 83. — *Caucalis leptophylla* L. Sp. pl. ed. 1 (1753) 242; Ldb. Fl. Ross. II, 341; Boiss. Fl. or. II, 1084; Shmal'g., Fl. I, 418; Grossg., Fl. Kavk. III, 134. — *C. pumila* Lam. Fl. Fr. III (1778) 425. — *C. parviflora* Lam. *Encycl.* I (1789) 657. — *C. humilis* Jacq. Hort. Vindob. II (1772) 92. — *Daucus leptophylla* Scop. Fl. Carniol. ed. 2, 1 (1772) 192. — *Daucalis leptophylla* Pomel, in *Nouv. Mat. Fl. Atl.* (1874) 149. — *Nigera parviflora* Bubani, Fl. pyren. II (1900) 404. — *Anthriscus leptophylla* K.-Pol. in Bull. Soc. Nat. Mosc. N.S. XXIX (1915) 151; Fl. Az. Ross. XI, 96. — *Selinum humile* E.H.L. Krause. — Ic.: Jacq. Hort. vind. II, tab. 195; Rchb. l. c. tab. 169. — Exs.: G.R.F. No. 2650; H.F.A.M. No. 234; P. Sint. It. trans.-pers. 1900–1901, No. 1795 (sub *T. stocksiana*).

Annual; root thin, fusiform; stems 10–30 cm high, solitary or few, erect, ascending or spreading close to ground, cylindrical or slightly faceted, thinly sulcate, scabrous from appressed retrorse bristly hairs, leaves oblong, the lower long-petioled, the upper on short petioles tapering to short dilated sheath with white-scarious margins, bi- or tripinnatisect, terminal lobes oblong or linear, acute, like petioles and petiolules covered with short antrorse bristly hairs; uppermost leaves sessile on narrow oblong sheaths. Umbels apparently terminal at first, but very soon shifting to lateral position owing to strong growth of lateral shoot, peduncles short in flower, becoming longer, 2–5 cm long; umbel rays short, 2–4, becoming thickened, covered with bristly hairs; involucre 0; leaflets of involuclers lanceolate-linear, as long as umbel; fertile flowers very short-pedicel or subsessile, the sterile on distinct pedicels; petals white, dorsally pubescent, caducous; fruit oblong, 4–6 mm long, homomorphous, crowned with triangular-lanceolate calyx-teeth; secondary ribs covered with 2–3 rows of scabrous acicular prickles with hamate apex, slightly longer than mericarp is wide. April–June. (Plate XI, Figure 1.)

- 164 Banks of mountain streams, dry slopes, weedy places. — European part: Crim. (southern shore); Caucasus: Dag., E. and S. Transc., Tal.; Centr. Asia: Syr D., Amu D., Pam.-Al., Mtn. Turkm., T. Sh. Gen. distr.: W. and E. Med., Bal.-As. Min., Arm.-Kurd., Iran. Introduced in Centr. and Atl. Eur. and N. Am. Described from France and Italy. Type in London.

Note. The following taxa have been reported for the USSR by some authors but according to our data they do not occur within its borders: 7. *Stocksiana* (Boiss.) Drude (in *E.-P. Natürl. Pflanzenfam.* III, 8 (1898) 156; Kozo-Pol. in Fl. Az. Ross. XV (1920) 98; Grossg., Fl. Kavk. III (1932) 134. — *Anthriscus stocksiana* K.-Pol. in Bull. Soc. Nat. Mosc. N.S. XXIX (1915) 151. — *A. leptophylla* β *stocksiana* K.-Pol. in Fl. Az. Ross. XV (1920) 97. — *Caucalis stocksiana* Boiss. *Diagn. ser.* II, 6 (1859) 89; this species is confined to Baluchistan, S. Iran and Arabia.

9. *T. xanthotricha* (Stev.) Schischk. comb. nov. — *Caucalis xanthotricha* Stev. in Bull. Soc. Nat. Mosc. XXIX (1856) 353.

Annual; similar to preceding species but stems sometimes higher, 40–50 cm, petals persistent sometimes until ripening, prickles of fruit yellow. May–June.

Stony slopes. — European part: Crim. (southern shore). Endemic. Described from the Laspa River valley. Type in Helsinki.

Note. All specimens seen from the Crimea (Balaklava, Simeiz) have typically yellow fruit, sometimes the petals persistent even after the fruit has ripened. This species is certainly very close to *T. leptophylla* (L.) Rchb., but as the characters of all the Crimean plants are consistent the species proposed by Steven has been retained.

Genus 958. **PSAMMOGETON** * Edg.

Edg. in Proc. Linn. Soc. I (1845) 253

Calyx-teeth lanceolate; petals white, pink or purple, the outer sometimes pubescent; fruit ovoid, tapering at commissure; stylopodium short-conical; styles long; mericarps with primary subglabrous filiform ribs and 4 secondary ribs covered with soft white spreading hairs and longer bristles nearly in 2 rows; canals under secondary ribs solitary, 2 at commissure. Annual herbs, leaves with setiform lobes.

35 Five species in Baluchistan, Afghanistan, Iran and Central Asia.

1. Stems and leaves shortly and densely pubescent; leaf lobes oblong-cuneate 3. *P. canescens* (DC.) Vatke.
- + Stems and leaves glabrous; leaf lobes setiform-filiform 2.
2. Umbels of 2–4 rays; leaf lobes 2–5 cm long ... 1. *P. setifolium* Boiss.
- + Umbels of 5–13 rays; leaf lobes 1–1.5 cm long 2. *P. borsczovii* (Rgl. et Schm.) Lipsky.

Series 1. *Setifolia* Schischk. — Stems and leaves glabrous; leaves setiform-filiform.

1. *P. setifolium* Boiss. Fl. or. II (1872) 1079. — *Torilis setifolia* Boiss. Diagn. ser. 2, II (1856) 95. — *T. heterotricha* Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 1 (1866) 329. — *Daucus setifolius* Kuntze in Tr. Bot. Sada, X (1887) 191. — *Cuminum cyminum* α *setosum* Boiss. Fl. or. II (1872) 1080. — *C. cyminum* B. Fedtsch. Rastit. Turkest. (1915) 609, non L. — *C. setifolium* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 209.

Annual; root thin, simple; stem thin, ca. 10–20 cm high, branching, finely sulcate; leaves on petioles expanded to scarious-margined sheath, twice ternately dissected into setiform, 1.5 cm long, 0.3 mm wide lobes. Umbels on 3 cm long stalks, with 2–3 irregular, 0.5–1.5 cm long glabrous rays; involucre of 2–3 setiform, entire or 3-partite caducous leaflets, scarious beneath; umbellets of 2–6 unequal, 1–5 mm long, furrowed,

* From the Greek *psamma* — sand, *geiton* — neighbor.

slightly scabrous rays; involuclers of 2-6 unequal divergent leaflets, the outer as long as umbellet, setiform, entire or 3-partite, scabrous; fruit slightly compressed laterally, with persistent calyx-teeth, 4-5 cm long, 1.5 mm wide; commissure concave, smooth; fruit hairy, covered with long bristles; ribs 9, equal; primary ribs 5, 3 dorsal, 2 lateral, protruding, nearly smooth, secondary ribs with bristles to 7 mm long, arranged in nearly 2 rows, slightly thickened at base, tips not hooked, canals under secondary ribs solitary, at commissure 2; stylopodium free, thin, 2-partite; albumen inflated at commissure, concave, with incurved margins; stylopodium conical; styles erect. Fl. May-June, Fr. August.

Sands, dry slopes, conglomerates, wormwood deserts. - Centr. Asia: Ar.-Casp. (rarely), Balkh., Kara K., Kyz. K., Amu D., Syr D., Mtn. Turkm., 166 T. Sh. (W.) Gen. distr.: Iran. Described from Afghanistan. Type in Geneva.

2. *P. borsczovii* (Rgl. et Schmalh.) Lipsky in Tr. Bot. Sada, XXIII (1904) 144. - *Torilis borsczovii* Rgl. et Schmalh. in Tr. Bot. Sada V (1877) 600. - *Cuminum borsczovii* K.-Pol. in Bull. Soc. Nat. Mosc. N.S. XXIX (1915) 209.

Annual; stem branching, 10-35 cm high, glabrous; leaves repeatedly ternate, on short amplexicaul sheathing petiole with scarious margin; lobes of last order linear-filiform, 1-1.5 cm long. Umbels of 5-12 very short-scabrous rays; involucre of 4-5 linear-lanceolate leaflets with scarious margins, at first nearly equal to rays, later only half as long; umbelllets many-rayed, 1-1.2 cm across; involuclers of many linear-lanceolate, white-membranous ciliate leaflets as long as umbel; calyx-teeth wide, acuminate; petals pink, clawed, oblong, obtuse; stylopodium conical; styles erect, long, as long as ovary and later of fruit; fruit oblong, 3 mm long, without bristles, 1.5 mm wide, slightly compressed laterally; primary ribs 5, densely covered with short branching hairs; secondary ribs densely covered with prickly bristles, twice or several times as long as fruit is wide. May. (Plate XII, Figure 1.)

Gypsiferous clays, clayey slopes, marl. - Centr. Asia: Ar.-Casp., Syr D. Endemic. Described from Ust-Urt. Type in Leningrad.

Series 2. *Crinita* Schischk. - Stems and leaves shortly and densely hairy, leaf lobes oblong-cuneate.

3. *P. canescens* (DC.) Vatke in App. ad Ind. Sem. Hart. Berol. (1876) 3. - *P. crinitum* Boiss. Fl. or. II (1872) 1078. - *P. tibetanum* Edgew. in Proc. Linn. Soc. I (1845) 253. - *Athamanta canescens* DC. Prodr. IV (1830) 153. - *Pimpinella crinita* Boiss. in Ann. Sc. Nat. 3 sér. I (1844) 131. - *Daucus crinitus* O. Ktze. in Tr. Bot. Sada, X (1887) 191. - *Cuminum crinitum* K.-Pol. in Bull. Soc. Nat. Mosc. N.S. XXIX (1915) 209. - Exs.: *P. Sintenis*, exs. No. 232.

Annual; stem branching from base, 15-40 cm high, densely covered with soft spreading hairs; radical leaves withering early, cauline leaves short-petioled, broadly triangular, 2.5-6 cm long, 2-6 cm wide, ternate; 169 primary lobes petioluled, pinnatisect into oblong, cuneate lobules with

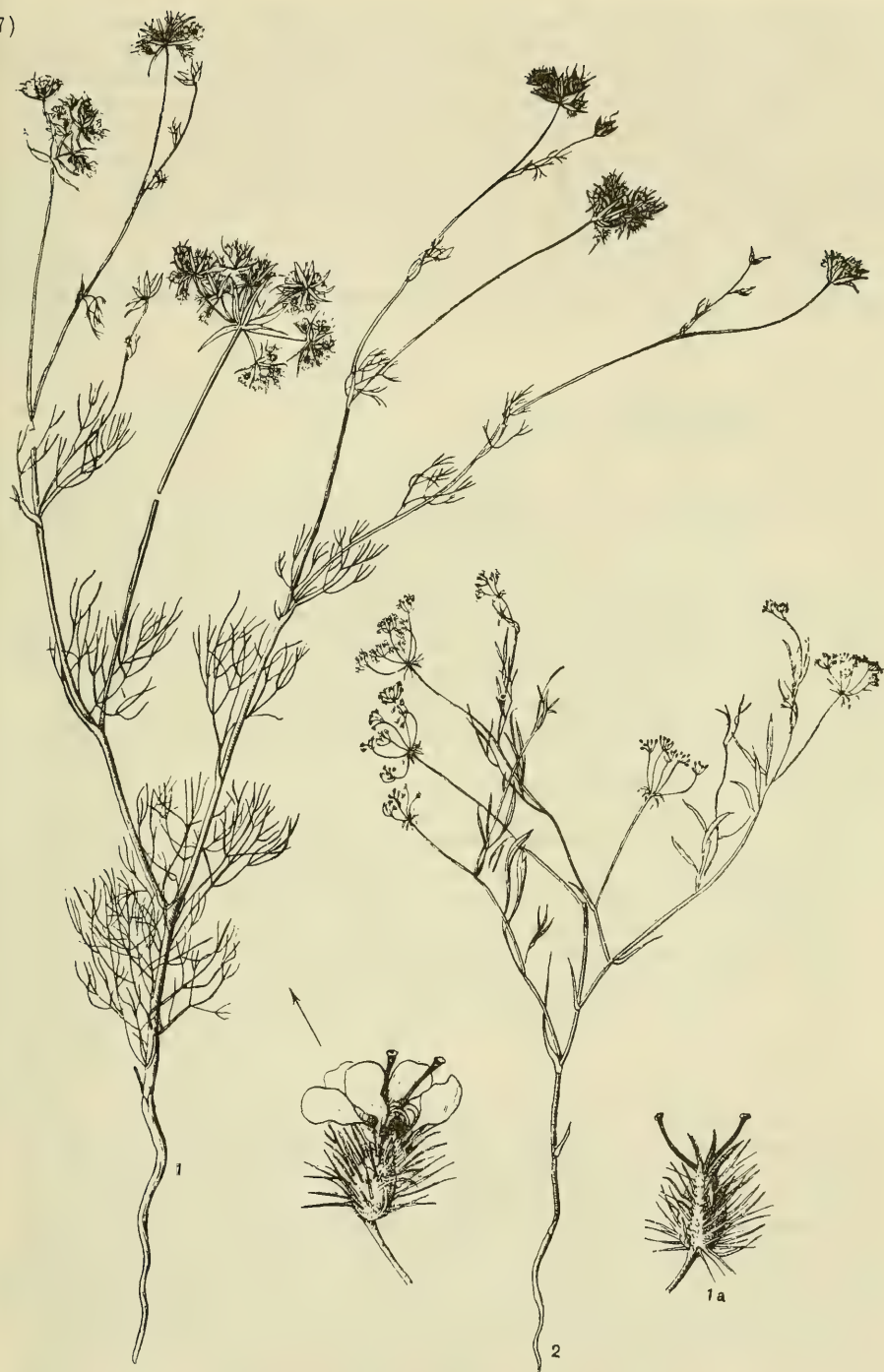


PLATE XII. 1, 1a — *Psammogeton borsczovii* (Rgl. et Schmalh.) Lipsky; 2 — *Aphanopleura leptoclada* (Aitch. et Hemsl.) Lipsky

2-3 incisions, covered with fine short spreading hairs; upper leaves sessile, smaller, and less dissected. Umbels on long peduncles, of 4-12 unequal rays covered with spreading hairs, involucre of 5 straight lanceolate-linear long-acuminate short-haired leaflets with broad scarious margins, half as long or as long as umbel rays; umbellets dense; involucels of 5 broadly ovate, hairy, nearly entirely scarious abruptly finely acuminate leaflets as long as umbels; petals white, pink or purple, the peripheral hairy; fruit ovoid, ca. 2.5 mm long, densely covered with soft, very fine capitate bristles twice as long as fruit is wide. May.

Dry slopes. — Centr. Asia: Mtn. Turkm. **Gen. distr.:** Iran. (Afghanistan, Baluchistan, Iran), Ind.-Him. Described from Iran. Type in Geneva.

Genus 959. **ASTRODAUCUS*** Drude

Drude in E.-P. Natürl. Pflanzenfam. III, 8 (1898) 156

Calyx-teeth short; petals white, deeply notched, expanded in peripheral flowers; fruit oblong-ovoid, slightly compressed laterally, subcircular in cross section; mericarps with 5 main, slightly protruding ribs bearing bristles; secondary ribs with 1 or 2 rows of setiform prickles with dilated base, sometimes connate; canals solitary under secondary ribs, 2 at commissure, these in furrow, partly covered with stereomatic bundle; albumen falcate in cross section, dorsally notched because of strongly protruding canals; stylopodium short-conical; styles long, ca. 2.5 mm; stigma capitate. Biennial plants, with repeatedly pinnatisect leaves and large main umbels.

Four species, E. Mediterranean area.

1. Involucels of 8-11 lanceolate-linear, acuminate leaflets; peripheral petals 2 mm long 3. *A. littoralis* (M. B.) Drude.
- + Involucels of 5 lanceolate leaflets; peripheral petals elongated, to 4 mm long 2.
2. Leaves slightly scabrous or glabrous, lobes of last order 1-4 mm long; fruit with dilated prickles, connate at base
- 170 + 1. *A. orientalis* (L.) Drude.
- Leaves short-hairy, lobes of last order 7 mm long; prickles on fruit not connate 2. *A. persicus* (Boiss.) Drude.

1. *A. orientalis* (L.) Drude in E.-P. Natürl. Pflanzenfam. III, 7-8 (1898) 271. — Kozo-Pol. in Fl. Az. Ross. XV, 92; Grossg. Fl. Kavk. III, 135. — *Caucalis orientalis* L. Sl. pl. (1753) 241; M. B. Fl. taur.-cauc. I, 208. — *C. royeri* Crantz, Cl. Umbell. emend. (1767) 109. — *C. pulcherrima* Willd. Enum. Hort. Berol. (1809) 303. — *Conium royeri* L. Sp. pl. (1753) 243. — *Platyspermum pulcherrimum* Koch, Umbell. (1824) 78. — *P. orientale* Eichw. Pl. casp.-cauc. (1831-1833) 5. — *Daucus pulcherrimus* Koch ap. DC. Prodr. IV (1830) 210; Ldb. Fl. Ross. II, 338; Boiss. Fl. or. II, 1072; Shmal'g., Fl. I, 417. — *Torilis orientalis* Calest. in Webbia (1905) 255. — Exs.: G. R. F. No. 1521; Herb. Fl. Cauc. No. 339.

* From the Greek astron — star, daucon — carrot.

Biennial; root fusiform; stem branching, 40–100 cm high, like leaves glabrous, but lobes slightly scabrous along margin; leaves triangular, repeatedly pinnatisect, lobes of last order narrowly linear, acute, 1–4 mm long, 0.3 mm wide, sometimes with sparse short bristly hairs along margins; upper cauline leaves smaller, sessile on dilated sheath. Umbels 4–8 cm across, of 8–15 glabrous rays; involucre 0 or of 1–3 (rarely of 5, var. *involutus* Bordz.) lanceolate-linear, acuminate leaflets with scarious margins; leaflets of involucre 5, lanceolate, with broadly scarious ciliate margin, thinly acuminate, appressed or spreading; calyx-teeth short; petals white, hairy outside, the outer petals to 4 mm long; fruit oblong-ovoid, 5–6 mm long, the setiform connate prickles longer than width of fruit, dilated at base, hardly scabrous (var. *glabratus* Thell.) or more or less long, hair-like (var. *eriocarpus* (Boiss.) Woron.); heterocarpy frequent, the central fruit of the umbel bearing very short prickles; stylopodium conical; styles to 2.5 mm long. June–July.

Stony and pebbly slopes. – European part: Balt. (escaped locally near Vilnius), Bl., Crim.; Caucasus: Cisc., W., E. and S. Transc., Tal.; Centr. Asia: Ar.-Casp. (Ust-Urt?). **Gen. distr.:** Arm.-Kurd., As. Min., Iran. Locally escaped in Poland and Czechoslovakia. Described after Tournefort's collection from the East. Type in London.

2. *A. persicus* (Boiss.) Drude in E.-P. Natürl. Pflanzenfam. III, 7–8 (1898) 157; Grossg., Fl. Kavk. III, 135. – *Daucus persicus* Boiss. in Ann. Sc. nat. ser. III, II (1844) 49. – *D. atropatanus* Stev. in Bull. Soc. Nat. Mosc. XXIX (1856) II, 352, in nota.

171 Biennial; root fusiform; stems cylindrical 50–100 cm high, glabrous, branching; leaves ovate, repeatedly pinnatisect, shortly and rather densely pubescent, lobes of the last order narrowly linear, acute, 7 mm long, 0.2 mm wide; upper cauline leaves smaller, sessile on dilated sheath, the uppermost reduced to lanceolate sheath. Umbels long-peduncled, 4–8 cm across, of 8–12 smooth rays; involucre 0 or of 1–3 lanceolate-linear, caducous leaflets; leaflets of involucre 5, lanceolate, white-membranous, with ciliate margin; petals white, the outer to 4 mm long, pubescent outside; fruit ovoid, 5 mm long, prickles on secondary ribs narrowly lanceolate, scabrous, not connate, twice as long as the diameter of fruit. June.

Shrubby formations, clayey slopes, gardens and vineyards. – Caucasus: S. Transc. (?). **Gen. distr.:** Iran. Described from Isfahan. Type in Geneva.

3. *A. littoralis* (M. B.) Drude in E.-P. Natürl. Pflanzenfam. III, 7–8 (1898) 157; Grossg., Fl. Kavk. III, 135. – *Caucalis littoralis* M. B. Fl. taur.-cauc. I (1808) 208. – *Cachrys littoralis* Spreng. Umbell. Prodr. IV (1818) 20. – *Platyspermum littorale* Koch, Umbell. (1824) 78. – *Daucus bessarabicus* DC. Prodr. IV (1830) 210; Ldb. Fl. Ross. II, 338; Shmal'g., Fl. I, 416. – *Torilis litoralis* Calest. in Webbia (1905) 255. – Ic.: Sibth. et Sm. Fl. Graeca, III, tab. 212. – Exs.: G. R. F. No. 61.

Biennial; entire plant glabrous; root vertical, fusiformly thickened; stems erect, 25–70 cm high, branching above or nearly from base; radical leaves broadly triangular, with petioles nearly as long as blade, blade ca.

15 cm long and nearly as wide, repeatedly pinnatisect; terminal lobes linear, acute, 3–7 mm long, ca. 0.3 cm wide; cauline leaves smaller, the uppermost sessile on amplexicaul sheath. Umbels of 10–18 nearly equal rays; involucre 0 or of 1–3 linear acute leaflets, with scarious margin; involucels of 8–11 lanceolate-linear, softly ciliate, thinly acuminate leaflets with broad scarious margin; petals white, ca. 2 mm long, subrounded, deeply notched, with incurved tip; fruit oblong, 6 mm long, 4 mm wide, prickles 5–7 in row, pyramidal, acute or abruptly attenuate into more or less long mucro. June–July.

Maritime and riparian sands, solonchaks. – European part: Bes., Bl., L. Don, Crim.; Caucasus: Cisc. (W.), W. Transc. Endemic. Described from the vicinity of Odessa. Type in Geneva.

172 Genus 960. **CAUCALIS*** L.

L. Sp. pl. (1753) 240. – *Daucus* sect. *Caucalis* Baill. Hist. pl. VII (1880) 90. – *Nigera* Bub. Fl. Pyren. II (1900) 404. – *Caucalis* sect. *Eucaucalis* Drude in E. – P. Natürl. Pflanzenfam. III, 8 (1898) 157

Calyx-teeth leaflike, acute; petals obcordate, white or reddish, deeply notched, with incurved lobe in notch, peripheral petals elongate. Fruit ovoid, laterally compressed, the main ribs hardly protruding, covered with bristles, the secondary ribs prominent, bearing single row of prickles or (very rarely) tubercles; canals solitary under secondary ribs, 2 canals at commissure. Mericarps subcircular in cross section; fibrous bundle of main ribs flat, more or less falcate; secondary ribs with cylindrical stereome bundle. Albumen deeply furrowed, with inrolled margins; base of ovary and fruit subtended by a crown of bristles. Annuals, with bristly hairs and bi- and tripinnate leaves.

Up to 4 species in Europe, Asia Minor and Central Asia.

1. Prickles on fruit as long as width of mericarps 1. *C. lappula* (Web.) Grande.
- + Prickles on fruit not developed, much shorter than width of mericarps 2. *C. bischoffii* K. – Pol.

1. *C. lappula* (Web.) Grande in Bull. Orto bot. Nap. V (1918) 194. – *C. daucoides* L. Syst. ed. XII (1767) 205, non L. Sp. pl. (1753) 241 quae est *Orlaya platycarpus* (L.) Koch; Ldb. Fl. Ross. II, 341; Boiss. Fl. or. II, 1084; Shmal'g., Fl. I, 418; Grossg., Fl. Kavk. III, 136. – *C. tenuifolia* Salisb. Prodr. (1796) 161. – *C. platycarpus* L. Sp. pl. (1753) 241, ex. p. – *C. royeri* Kozo-Pol. in Fl. Az. Ross. XV (1920) 113 non Crantz. – *Daucus platycarpus* Scop. Fl. carn. ed. 2, I (1772) 190, nec Čelak. – *D. lappula* Web. in Wigg. Prim. Fl. Holsat. (1780) 23. – *D. royeri* Baill. Hist. pl. VII (1880) 89. – *D. caucalis* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 159. – *Conium royeri* Willd. in Linn. Spec. pl. ed. 3, I (1764) 350, nec L., quod est *Astrodaucas orientalis* (L.) Drude. – *Nigera daucoides* Bub. Fl. Pyren. II (1900) 404. – Ic.: Fedch. and Fler., Fl. Evrop. Ross. II, fig. 553. – Exs.: G. R. F. No. 1728.

* From the Greek *kejein* – creep, *kaulos* – stem, referring to the creeping stems of some species.

73 Annual; root thin, fusiform; stems erect, 10–40 cm high; branching, like leaves covered with long scattered bristles or subglabrous; leaves bi- or tripinnatisect, with pinnatipartite lobes, lower leaves short-petioled, upper sessile on sheaths; lobes of first order ovate, obtuse, the lower lobes on short petioles, the upper sessile; lobes of last order oblong, pinnatifid into 2–4 mm long, linear or narrowly lanceolate, usually entire lobules; sheath short, oblong, with ciliate scarious margin. Umbels opposite leaves, of 2–5 scabrous rays with scabrous upper margin; involucre 0; involucels usually of 3–5 lanceolate scabrous leaflets with slightly ciliate margin; calyx-teeth ovate-lanceolate, to 1.5 mm long; petals white or reddish, broadly obovate (2 mm long, 2.5 mm wide), deeply notched, glabrous; fruit ovoid-oblong, 8–10 mm long, ca. 5 mm across. April–May. (Plate XIII, Figure 1.)

Among shrubs on slopes, fields, cereal crops, melon fields, roadsides, railway embankments. — European part: Lad.-Ilm., U. Dnp., M. Dnp., V.-Don, L. Don, Transv., V.-Kama (extreme west), Bes., U. Dns., Bl.; Caucasus: Cisc., Dag., E., W. and S. Transc.; Centr. Asia: Mtn. Turkm. **Gen. distr.:** Centr. and Atl. Eur., Med., Bal.-As. Min., Arm.-Kurd, Iran. Described from Europe. Type in London.

Economic importance. This weed is advancing in the USSR northwards and eastwards. The prickly fruits mixed with oats and fed to horses cause injury to the oral cavity (Larin).

2. *C. bischoffii* K.-Pol. in Bull. Soc. Nat. Mosc. N.S. XXIX (1915) 153. — *C. muricata* Bischoff, Delect. sem. Horti Heidelb. (1839) et in Linnaea. XIV (1840), Lit. Ber. p. 131, non Crantz (1767); C.A.M. in App. ad Ind. IX, sem. Horti Petropol. (1843) 64; Ldb. Fl. Ross. II, 340. — *C. daucoides* β *muricata* Gr. et Gord. Fl. Fr. II (1850) 674; Shmal'g., Fl. Sr. i Yuzhn. Ross. I (1895) 418. — *C. hordeicarpa* Makaschvili in Grossg., Fl. Kavk. III (1932) 136.

Annual; distinguished from *C. daucoides* L. only by the very short prickles of the fruit which are several times shorter than the width of the mericarp reduced to tubercles. May.

Weedy habitats and fields of wheat and barley. — European part: Crim. (Simferopol); Caucasus: Cisc., W. and E. Transc. **Gen. distr.:** Bal.-As. Min., Med. Described from Crim. Type in Heidelberg (?).

Note. Of the 3 specimens in the Botanical Institute, one was collected in 1842 near Simferopol, the second in Kuban, and the third was grown from seeds collected in Georgia.

174 Kozo-Polyanskii (Fl. Az. Ross. XV (1920) 61) claimed the American species *Yabea microcarpa* (Hook. et Arn.) K.-Pol. as belonging to a new genus *Yabea* K.-Pol. (Bull. Soc. Nat. Mosc. XXVIII (1914) 202; XXIX (1915) 144) known from the vicinity of Vladivostok, where it had been introduced and where the fruits had been collected together with those of *Torilis japonica* DC. Subsequent studies have failed to confirm the presence of *Y. microcarpa* near Vladivostok, and Komarov omitted it from his "Key." Our study of extensive herbarium material from the Far East failed to reveal traces of *Yabea*. It is therefore excluded from "Flora of the USSR."

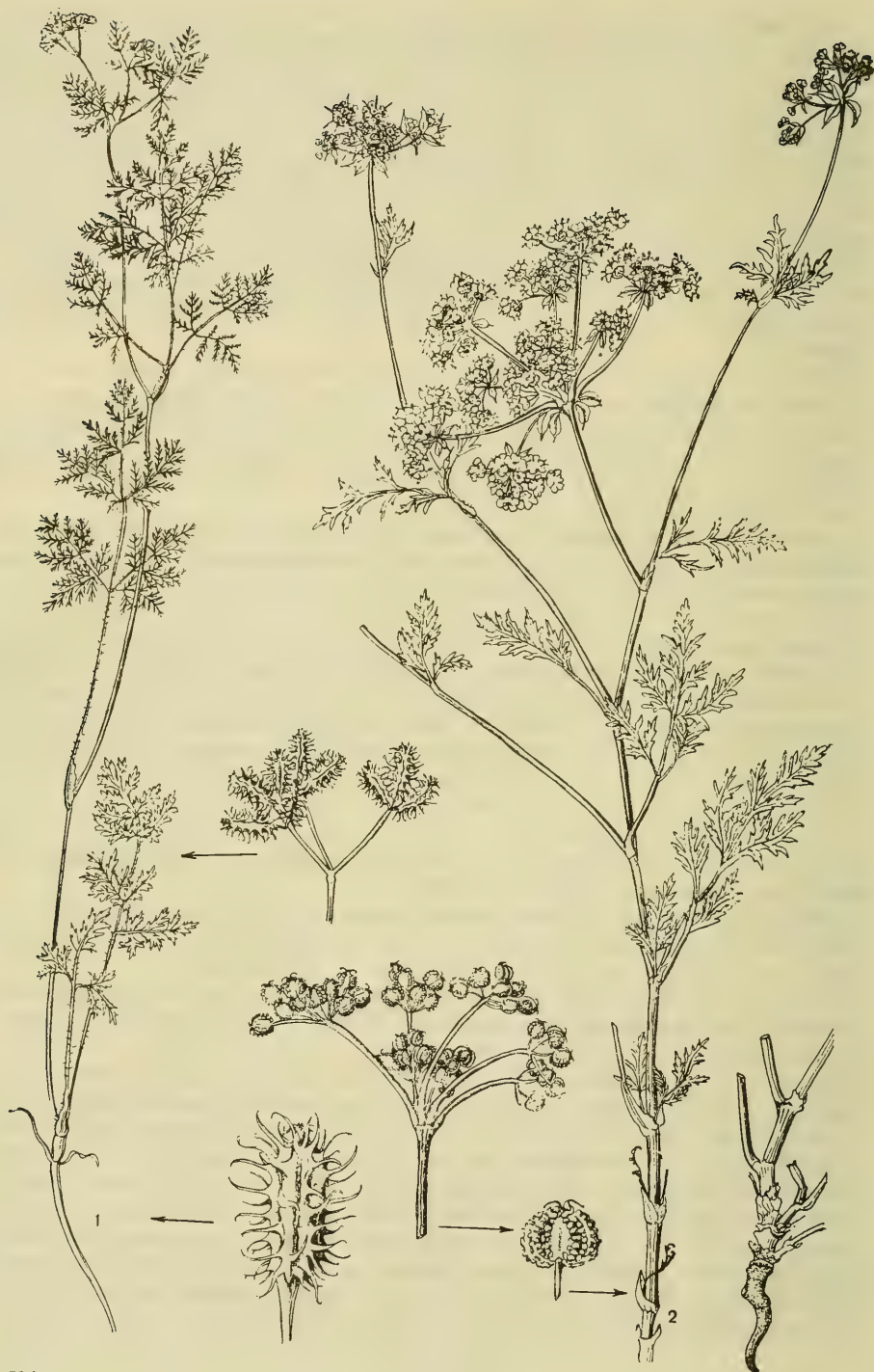


PLATE XIII. 1 - *Caucalis lappula* (Web.) Grande.; 2 - *Eremodaucus lehmannii* Bge.

Genus 961. **TURGENIA*** Hoffm.

Hoff. Umbell. ed.1 (1814) 59.— *Caucalis* subgenus *Turgenia* Drude in E.-P. Natürl. Pflanzenfam. III, 8 (1898) 157.— *Turgenia* subgenus *Turgeniodoxa* K.-Pol. in Fl. Az. Ross.XV (1920) 108

Calyx-teeth lanceolate, acute or nearly subulate; petals pink, purple or nearly white, obovate; fruit ovoid, laterally compressed; stylopodium conical, styles short, thick; mericarps subcircular in cross section, the protruding main and secondary ribs, bearing 1-3 rows of scabrous prickles shorter than the width of the fruit. Cross section of ribs shows small elliptic stereomes; canals single in valliculae, 2 approximate at commissure; hypodermal tissue between endosperm and mesocarp; albumen very concave, its margins turned inwards; carpophore free, 2-cleft above; ovary and fruit subtended by a whorl of prickles. Scabrous hairy annual herbs with simple-pinnate leaves.

Monotypic genus, in Central Europe, W. Siberia, Central Asia, the Mediterranean area, and eastwards to Kashmir.

1. *T. latifolia* (L.) Hoffm. Gen. Umbell. ed.2 (1816) 59; Ldb. Fl. Ross. II, 342; Boiss. Fl. or. II, 1087; Kozo-Pol. in Fl. Az. Ross. XV, 108; Grossg., Fl. Kavk. III, 137; Kryl., Fl. Zap. Sib. VIII, 2033.— *Tordylium latifolium* L. Sp. pl. (1753) 240.— *Caucalis latifolia* L. Syst. VII (1768) 205; Shmal'g., Fl. I, 418.— *Daucus latifolius* Bail. Hist. pl. VII (1880) 89.— *D. turgenia* E.H.L. Krause in Sturm, Fl. Deutschl. ed.2, XII (1904) 158.— Ic.: Kozo-Pol., ibid., tabl. 9.— Exs.: H. F. A. M. No. 316.

Annual; stem erect, 20-60 cm tall, finely ribbed, branching, covered with short spreading stiff hairs with recurved tips and longer bristly prickles; leaves pinnate, 4-20 cm long, 3-10 cm wide, pubescent on both sides, with bristles along nerves beneath; leaf lobes oblong, obtuse, dentate, 1-4 cm long, 3-15 mm wide, sessile, somewhat decurrent, only lowermost pair short-petioluled. Umbels 4-6 cm across, of 3-5 ribbed, bristly-hairy rays; involucre and involucels of 5 oblong-ovate, acuminate or obtuse pubescent leaflets with white-scarious margins; umbels few-flowered, with 3-5 bisexual (fertile), 3-4 sterile (staminate) flowers on 1.5-3 mm long pedicels; calyx-teeth triangular, acute, with scarious ciliate margins, unequal, 0.5-1 mm long; petals pink, purple or nearly white, short-hairy outside, obovate, with narrow terminal cusp, 1.5-2 mm long, in bisexual flowers one petal much enlarged, ca. 3 mm long, 4-5 mm wide, obreniform; fruit ovoid, 7-9 mm long, 5-6 mm wide, slightly compressed laterally, ribs with long, large prickles with thickened base, covered with short prickles. May-June.

Mountain slopes, steppes, fallow fields, crops, near dwellings.— European part: Lad.-Ilm. (introduced along railway lines), Transv. (Kinel, in the west), L. Don, Bl., Bes., Crim.; Caucasus: all regions; Centr. Asia: Balkh., Dzu.-Tarb., T. Sh., Syr D., Amu D., Pam.-Al., Mtn. Turkm. Gen. distr.: Centr. Eur. (introduced), Med., Bal.-As. Min., Ind.-Him., N. Am. (introduced). Described from France and Italy. Type in London.

Economic importance. A weed of crops in the southern regions of the USSR, especially in the spring.

* Named in honor of D.A. Turgenev, Director of the Office of Prince Golitsyn, a friend and classmate of Hoffman at Göttingen University.

Genus 962. **LISAEA*** Boiss.

Boiss. in Ann. sc. nat.3, sér.II (1844) 54

Calyx 5-toothed; petals white, notched, the peripheral deeply 2-cleft, strongly elongating; fruit compressed laterally; mericarps with 3 primary narrowly winged dorsal ribs, often with teeth; secondary ribs obscure, sometimes with few longitudinal hamate bristles or tubercles; stylopodium 178 conical; canals inconspicuous; albumen with inrolled margins. Annual herbs with simple-pinnate leaves and short pubescence.

Five species in Asia Minor, Iran and S. Transcaucasia.

1. Mature fruits glabrous, finely tuberculate; marginal petals 5–12 mm long 1. *L. heterocarpa* (DC.) Boiss.
- + Mature fruits densely pubescent; peripheral petals 3–5 mm long 2. *L. armena* Schischk.

1. *L. heterocarpa* (DC.) Boiss. Fl. or. II (1872) 1088; Grossg., Fl. Kavk. III, 137. — *L. grandiflora* Boiss. in Ann. Sc. Nat. 3 sér. II (1844) 54. — *Turgenia heterocarpa* DC. Prodr. IV (1830) 218.

Annual; stem 15–80 cm high, single or few, erect, simple or branching, densely covered with very short hairs and rather long (ca. 1 mm) ones with hamate tip; radical leaves withering early; lower cauline leaves on more or less long petioles, broadly ovate, 6–7 cm long, 4–5 cm wide, simple to pinnate; leaf lobes oblong, sessile, the upper decurrent, like stem covered with short hairs, with long spiny-tipped bristles along nerves; upper leaves smaller, sessile on short sheaths with white-scarious margins. Umbels of 8–15 short-hairy bristly rays; involucre and involucels of 5–6 oblong, subentire, scarious leaflets; petals white, the peripheral much elongated, 10–12 mm long, 2-lobed up to middle or deeper; fruit ovoid, 9–10 mm long, 5–6 mm wide, the juvenile finely scabrous, the adult glabrous, more or less densely verrucose; the 3 dorsal ribs filiform or with distinct wings with lanceolate prickles. May–June. (Plate XIV, Figures 2, 2b.)

Weed of crops. — Caucasus: S. Transc. Gen. distr.: Iran. Described from Iran (near Pāreh, province of Khoi, and along road from Bagdad to Kermanshah). Type in Geneva.

2. *L. armena* Schischk. in Refer. n.-i. rabot za 1945 g. Otd. Biol. n. AN SSSR (1947) 10. — *L. syriaca* Grossg., Fl. Kavk. III, 137, non Boiss.

181 Annual; root vertical, 3–4 mm thick; stem 15–40 cm high, branching from base or only above, densely covered with very short hairs, mixed with longer (1 mm) ones, with hamate tip; leaves broadly ovate, simple to pinnate, like stem both sides short-hairy, with rather long bristly hairs along nerves and margins; leaf 8–10 cm long, ca. 5 cm wide; leaflets oblong, 3–4 cm long, 1–1.5 cm wide, with antrorse, obtuse, triangular teeth. Umbels 2.5–3.5 cm across, of 5–6 angular rays with the same pubescence as stem; involucre of 5 ovate-lanceolate or lanceolate, acuminate, subentire, scarious leaflets slightly shorter than umbel rays; involucels of 5 ovate acuminate leaflets, nearly as long as umbels, scarious except for midrib; petals white, the peripheral much elongated, 3–5 mm long, 2-lobed

* Named after Lisa, an authority on Italian mosses and student of Piemonte flora.



PLATE XIV. 1 - *Orlaya grandiflora* (L.) Hoffm.; 2, 2b - *Lisaea heterocarpa* (DC.) Boiss.; 3 - *L. armena* Schischk.; 4 - *Orlaya platycarpus* (L.) Koch.

to middle or deeper; fruit densely villous-hairy, readily splitting, the mericarps ovoid, 7 mm long, 4 mm wide, lateral ribs winged, with 3-4 bristly teeth; median rib narrowly winged, 3-4-toothed; secondary ribs with few hamate bristles; stylopodium conical; styles ca. 2 mm long, often violet. May-June. (Plate XIV, Figure 3.)

Plowed fields, crops. - Caucasus: S. Transc. (Erevan). **Gen. distr.:** Arm.-Kurd. Described from Turkish Armenia (near Malazgirt). Type in Leningrad.

Note. Similar to *L. papyracea* Boiss. in pubescence of fruits, but distinguished by the lower stature, the narrower wings of the mericarp and the leaves, which are hairy on both sides, not glabrous with scabrosity confined to nerves and margins.

Genus 963. **ORLAYA*** Hoffm.

Hoffm. Umbell. ed.1 (1814) 58

Flowers often bisexual, some staminate; calyx of 5 subulate teeth; petals oblong-obcordate, with narrow, acute incurved tip, gradually or abruptly tapering to short claw at base, outer petals of peripheral flowers 4-10 times as large as the others, deeply 2-lobed; fruit ellipsoid, strongly compressed dorsally; the 5 main ribs filiform, with many rows of short bristles; the stereomes in flat bundles linear or falcate in cross sections; the 4 secondary ribs more highly developed, nearly winged, filled with spongy, thin-walled tissue with 1-3 rows of recurved prickles with flattened base and hamate apex; canals single under valliculae, 2 at commissure; more or less numerous crystals in mesocarp, toward commissure; albumen plano-calyciform, slightly notched; stylopodium 2-cleft at tip or nearly to middle; styles 4-5 times as long as the short stylopodium. Annual nearly entirely glabrous herbs, with repeatedly pinnatisect leaves; involucre and involucels of many leaflets with broad white scarious margins.

Three species in the floristic region of the Mediterranean and in Central Europe.

1. Leaflets of involucre and umbel rays 5-8; peripheral petals elongate, 8-10 times as large as the others; secondary ribs equal; styles 2.5-4 mm long 1. *O. grandiflora* (L.) Hoffm.
- + Leaflets of involucre and umbel rays 2-3(5); peripheral petals 4-5 times as long as the others; 2 outer secondary ribs nearly twice as long as the others (median); styles 1.5-2 mm long 2. *O. platycarpus* (L.) Koch.

Section 1. EUORLAYA Calest. in Webbia, I (1905) 265. - *Daucus* sect. *Orlaya* Čelak in Bot. Zeit. XXXI (1873) 44. - *Orlaya* sect. *Orlaya* Thell. in Hegi, Illustr. Fl. Mitteleur. V, 2 (1926) 1068. - Leaflets of perianth and umbel rays 5-8(12); peripheral petals 8-10 times as large as the others; secondary ribs equal; styles 2.5-4 mm long, with subglobular disciform stigma.

* Named after Johann Orlay, botanist and physician, secretary of the Medical-Surgical Academy in Moscow.

1. *O. grandiflora* (L.) Hoffm. Umbell. ed.1 (1814) 58; DC. Prodr.IV, 206; Ldb. Fl. Ross.I, 337; Kozo-Pol. in Fl. Az. Ross.XV, 116; Grossg., Fl. Kavk.III, 138.— *Caucalis grandiflora* L. Sp. pl. (1753) 240.— *Daucus grandiflorus* Scop. Fl. Carn. ed.2 (1772) 189, nec. Desf.; Shmal'g., Fl.I, 417.— *D. grandiflorus* var. *typicus* Fiori et Paol. Fl. anal. Ital.II, 1 (1889) 89.— *Platyspermum grandiflorum* Mert. et Koch in Roehl: Deutschl. Fl. ed.3, II (1826) 360.— Ic.: Rchb. Ic. Fl. Germ.XXI, tab.1998; Hegi.III. Fl.V, 2, Taf.194, f.1.— Exs.: Callier, Iter taur. tert. No. 618; Dörfl. Herb. norm.No.4326.

Annual; root simple, thin, fusiform; stem usually erect, 10–50 cm high, simple or branching from base, glabrous; leaves bi- or tripinnate, glabrous, sometimes with scattered bristles along nerves and scabrous-ciliate margins, sheathing bases of lower leaves with white-scarious margins, upper leaves sessile on sheaths; lobes of first order rounded-ovate, obtuse, lobes of last order linear, ca. 1 mm wide, entire, short-mucronate. Umbels ca. 5 cm across, pedunculate, the 5–10 rays short-scarious inside; leaflets of involucre 5, lanceolate, acuminate, greenish with whitish longitudinal nerves and broad scarious-ciliate margin, leaflets nearly as long as umbel rays; involucels of 3–8-leaved elliptic-lanceolate, short-acuminate leaflets exceeding the rays; umbellets with 2–4 pistillate and numerous staminate flowers; petals white, sometimes with reddish or violet tinge, the peripheral much elongated, 8–13(18) mm long, nearly 10 times as long as the others; fruit ovoid, 10 mm long, 5 mm wide; secondary ribs equal; styles 2.5–4 mm long. June–July. (Plate XIV, Figure 1.)

Light oak forests, limestone slopes, roadsides, abandoned fields.— European part: Crim.; Caucasus: W.Transc.; Centr. Asia: Syr D. (Khodzhent). Gen. distr.: Centr. Eur., Med., Bal.-As. Min. Described from S.Europe. Type in London.

Section 2. *PLATORLAYA* Calest. in Webbia, I (1905) 265.— *Daucus* sect. *Heteracanthion* Čelak. in Bot. Zeit. Neue Rehe, XXXI (1873) 44, p.p.— Leaflets of involucre and umbel rays usually 2–3(5), marginal petals not more than 5 times as long as the others, 4–5(8) mm long, mericarps with 2 outer secondary ribs nearly twice as long as the median, styles 1.5–2 mm long, with decurrent stigma.

2. *O. platycarpus* (L.) Koch, Umbell. (1824) 79; DC. Prodr.IV, 209; Ldb. Fl. Ross.II, 337; Boiss. Fl. or.II, 1071; Grossg., Fl. Kavk.III, 138.— *Caucalis platycarpus* L. Sp. pl. (1753) 241.— *C. daucoides* L. Sp. pl. (1753) nec Syst. ed.10 (1759).— *Daucus platycarpus* Čelak. in Bot. Zeit. XXXI (1873) 44, nec Scop.; Shmal'g., Fl.I, 417.— Ic.: Koch, in Nov. Act. Nat. Cur.XII, tab.9 (1824).— Exs.: G.R.F. No.1727.

Annual; root thin, fusiform, simple; stem usually erect, 10–30 cm high, often branching from base, the lower half covered sparsely by stiff spreading hairs or glabrous; leaves bi- or nearly tripinnate, petioles and nerves rather densely covered with spreading bristly hairs, lower and median leaves ovate, 3–6 cm long, 1.5–4 cm wide, with oblong white-scarious sheath, stiff-ciliate along margin; lobes of first order broadly ovate, of the last order lanceolate or ovate-lanceolate, 0.5–1 mm wide, obtuse or

acute but without distinct mucro. Umbels 2-3 cm across, pedunculate, of
184 2-3(4) smooth or nearly smooth rays; leaflets of involucre and involucels
2-3(5), lanceolate, acuminate, entire or incised above, with scarious-ciliate
margin, nearly as long as rays; umbellets with 2-4 pistillate and numerous
staminate flowers; petals white, the peripheral elongated to 5 mm, 5 times
as long as the others; fruit ovoid, 10 mm long, 5 mm wide. Fl. May, Fr.
June-July. (Plate XIV, Figure 4.)

Southern slopes, frequently on limestone slopes in mountain forests,
vineyards, exposed slopes, roadsides. - European part: Crim. (southern
shore); Caucasus: Dag., Cisc., W., E. and S. Transc. Gen. distr.: Med.,
Bal.-As. Min., Arm.-Kurd. Described from Italy. Type in London.

Tribe 3. CORIANDREAE Koch, Umbell. (1824) 82. - Flowers bisexual or
staminate in terminal umbels; marginal petals usually elongated, deeply
2-partite; fruit globose-ovoid, smooth, geminate or of 2 firmly united sub-
globose mericarps with inconspicuous or slightly prominent arcuate ribs,
often without oil tubes, with 2 large canals at commissure; the woody
mesocarp gives the mericarps a nutlike aspect. Albumen calyciformly
concave.

Genus 964. **CORIANDRUM** * L.

L. Sp. pl. (1753) 256. - *Keramocarpus* Fenzl in Russeg. Reise, II (1843) 966. - *Ceramocarpus*
Wittst. Ethym.-bot. Handwört. (1852) 173

Flowers bisexual, in part staminate. Sepals 5, dentiform, irregular,
persistent; petals white or pink, obcordate, with incurved obtuse or notched
incurved lobe, the peripheral elongated, deeply 2-cleft; fruit globose, firm,
nut-shaped, mericarps separating with difficulty, subcircular in cross
section, smooth when fresh, when ripe with 5 undulant protruding ribs and
6 alternate erect filiform eminences, giving 10 undulant and 10 erect ribs
for entire fruit (if the commissural ribs are counted separately from the
fused marginal ribs, the total is 12); median layer of fruit wall woody, the
stratum of thick-walled cells interrupted only at commissure by thin
parenchymatous cells; canals in vallecule 0, at commissure 2; stylo-
podium conical; styles elongate; carpophore weakly developed, 2-cleft,
the lower half fused with commissure; albumen concave.

185 Two species, Mediterranean area.

1. *C. sativum* L. Sp. pl. ed. 1 (1753) 256; Ldb. Fl. Ross. II, 367; Boiss.
Fl. or. II, 920; Shmal'g., Fl. I, 429; Grossg., Fl. Kavk. III, 138. - *C. majus*
Gouan, Hort. Monsp. (1768) 145. - *C. diversifolium* Gilib. Fl. lithuan.
II (1782) 26. - *C. globosum* Salisb. Prodr. (1796) 166. - *C. melphi-*
tense Ten. et Gun. Ind. sem. Horti Neap. (1837) 3. - *Selinum cori-*
andrum E. K. L. Krause in Sturm, Fl. Deutschl. ed. 2 XII (1904) 163. -
Ic.: Syreishch., Ill. Fl. Mosk. gub. II, p. 428; Komar., Sb., sushka i razved.
lekarstv. rast. ed. 3, Fig. 50 (1917).

* From koriannon - the Greek name of coriander in Aristophanes, Theophrastus and others; presumably
from the Greek koris - bug, anison - anise.

Annual; entire plant glabrous; root thin, fusiform; stem erect, 20–70 cm high, cylindrical, finely sulcate, branching above or from base; leaves pale green, the radical early withering, long-petioled, entire, incised-dentate or 3-lobed or 3-partite or pinnate, with rounded-cuneate, incised-dentate leaflets; lower cauline leaves bipinnate, with few ovate pinnatifid leaflets usually with cuneate base; median and upper cauline leaves sessile on sheaths with broadly scarious margin, bi- or tripinnatisect into linear or subfiliform, usually entire, acute lobes. Umbels long-pedunculate, of 3–5 glabrous rays; involucre 0 or of 1 leaflet; involucels secund, usually of 3 very narrow, filiform-subulate leaflets with tuft-like tip; calyx-teeth triangular-lanceolate or linear, irregular, 2 outer much longer than the 3 inner; petals white or reddish, the peripheral unpaired, petals 3–4 mm long, deeply 2-lobed, with oblong-obovate lobes, the 2 adjacent petals asymmetrical, obliquely obcordate, 2-lobed, the anterior lobe much larger than the posterior, 2 remaining petals small, symmetrical, obcordate; petals of remaining flowers faintly notched; fruit globose, 2–5 mm across, brown- or straw-yellow; styles elongate, diverging at acute angle, 2–3 times as long as conical stylopodium, with slightly thickened tip. June–July.

Cultivated, often as weed of gardens and crops, near dwellings and roadsides. — European part: Balt., U. Dnp., U. V., M. Dnp., V.-Don, L. Don, V.-Kama, Transv.; Far East: Uss.; Caucasus: Cisc., Dag., W., E. and S. Transc.; Centr. Asia: Amu D., Syr. D., W. T. Sh., Mtn. Turkm. Gen. distr.: Centr. and Atl. Eur., Med., Bal.-As. Min., Iran., introduced in N. and S. Am. Described from Italian fields. Type in London.

186 **Economic importance.** The young stems sometimes (Georgia) serve as spice, called "kinza." The dried stems serve as fuel. The fruit contains from 0.68 to 0.8–0.9% (1.18%) essential coriander oil, with coriandrol as main component and 5% pinene. The oil is obtained by soaking the fruit in water for 12–16 hours and distilling it with water. It is used in the making of perfumes, in the manufacture of soap and liqueurs, and as a substitute for many aromatic substances to improve the taste of medicines. The fruit is sometimes used to flavor pastries and as a spice for canned meat products.

The fruit also contains 18% fatty oil. This is extracted from the residue of the distilled essential oil, for use in manufacture of soap and in the textile industry. After the extraction of fatty oil protein-rich oil cakes are obtained which are fed to cattle. According to Belyaev their composition is: water 20.97%, protein 12.88%, fat 4.15%, nitrogen-free extractive substances 20.7%, cellulose 34.4% and ash 7%.

The green plant too contains essential oil; its composition is entirely different from that of the fruit.

Coriander is indigenous to the Mediterranean countries, but is cultivated in Central and South Europe, in the central and southeastern parts of the European part of the USSR and in the Caucasus.

Calyx-teeth acuminate, with broad base; petals obovate or oblong, acutely notched or emarginate, with acute inward curved lobe; stylopodium semiconical, bearing styles 3 times as long as stylopodium; fruit subglobose or ovoid, circular in cross section, smooth, glabrous, with longitudinal furrows or striae; mericarps hard, firmly united (not even a hammer stroke will separate them); the stereomatic girdle of each mericarp is
 187 completely fused; ribs and valleculeae are inconspicuous; oil tubes numerous, in 2 zones: above and under stereome, without any particular order, and 1 in each vallecule and rib; usually only 1 seed develops per fruit; crystals absent. Low perennial herbs with reduced internodes; leaves bi- or tripinnatisect, with palmate or verticillate lobes; involucre of 1-6 small, caducous leaflets; involucels of 7-11 linear-lanceolate or subulate leaflets.

Two species, in the mountains of W. Tien Shan and Pamir-Alai.

1. Plant completely glabrous 1. *S. melifolia* Rgl. et Schm.
 + Leaves scabrous 2. *S. pentaceros* (Korov.) Schischk.

1. *S. meifolia* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestvozn. antropol. i etnograf. Mosk. univ. XXIV, 2 (1881) 40; Lipskii in Tr. Bot. Sada, XVIII, 1 (1900) 76; Kozo-Pol. in Fl. Az. Ross. XV, 66. — *S. margaritae* Korov. in Izv. Inst. Pochvov. i geobot. Sredneaz. Gos. iniv. I (1925) 105. — Ic.: Kozo-Pol., ibid., tabl. 8, Figure 3.

Perennial; root neck covered with numerous leaf sheaths and remnants of leaves; stem 10-30(40) cm high, usually single, with reduced internodes, branching at base, glabrous, sulcate; branches long, nearly leafless, since leaves mostly radical or at base of branches; radical leaves short-petioled, the others with expanded membranous sheaths; leaf blades in general oblong or oblong-linear, 10-12 cm long, 2.3-2.5 cm wide, bipinnatisect, the lobes obovate, palmately (rarely nearly pinnately) divided into numerous, small, acute, linear-lanceolate, linear or setiform lobules 1-3 mm long, 0.5 mm wide. Umbels of 10-15 markedly unequal rays, the inner much shorter than the rest; involucre of 1-6 small, acute, caducous leaflets; involucels of 7-11 linear-lanceolate or subulate leaflets; umbellets 8-11-flowered, one male, the others bisexual, central flowers usually bisexual, sessile, the outer usually male; petals white; fruit subglobose; stylopodium not developed. May-June. (Plate XIVa, Figure 2; Plate XV, Figure 5.)

- 188 Stony slopes, alpine and subalpine grass plots, 2,400 to 3,300 m. — Centr. Asia: T. Sh. (Tashkent-Ala-Tau, Kara-Tau and Fergana ranges), Pam.-Al. (Gissar Range). Endemic. Described from Makshevsk Gorge at the Zeravshan River, from Fedchenko's collections. Type in Leningrad.

* Treatment by B.A. Fedchenko.

** After the noted geologist G.E. Shchurovskii, president of the Society of Natural Science, Anthropology and Ethnography.



PLATE XIVa. 1 — *Kosopoljanskia turkestanica* Korov.; 2 — *Schtschurovskia meifolia* Rgl. et Schmalh.

2. *S. pentaceros* (Korov.) Schichk. — *Kosopoljanskia pentaceros* Korov. in Trud. Turk. nauchn. obshch. I (1925) 105. — Ic.: *ibid.*, Figure 1.

Perennial; root rather thick, vertical; stems nearly obsolete, few leafless umbels produced from radical rosette; leaves glaucescent, radical, prostrate on ground, oblong, 8 cm long, 2 cm wide, scabrous from scattered short hairs, bi- or nearly tripinnatisect, on short petioles expanded to sheath, primary lobes, remote, sessile, lobes of the last order narrowly lanceolate or spatulate, 2–3 cm long, 0.5–1.5 mm wide, with callous-mucronate apex. Umbels of 7–10 rays, central umbel sessile, fertile, the lateral nearly sterile; leaflets of involucre 1–3, linear-subulate, caducous; umbellets 10–15-flowered; involucels of 6–10 lanceolate leaflets nearly as long as umbellets; calyx-teeth spreading lanceolate-subulate, hardening and elongating in fruit; petals oblong, 1.5–1.7 mm long, white, violet along midrib, notched, with inward curved lobe; fruit short-cylindrical, glabrous, rarely with short hairs, 5 mm long, 2.5–4 mm wide, with protruding cylindrical ribs; pericarp with thick annular sclerenchymatous layer, no canals under valliculae, 2 very narrow ones at commissure; stylopodium conical; styles erect or hardly divergent, 3 mm long, nearly half the length of the fruit. July–August.

Stony slopes, ca. 2,200 m. — Centr. Asia: T. Sh. Endemic. Described from Kirghiz Ala-Tau. Type in Tashkent.

Genus 966. **KOSOPOLJANSKIA*** Korov.

Korov. in Tr. Turkest. nauchn. obshch. I (1923) 85

191 Calyx-teeth lanceolate-subulate, half the length of the petals, persistent in fruit, soft, not hardening; petals oblong, white, notched, with inward curved lobe; fruit ovoid or short-cylindrical, smooth or slightly scabrous; stylopodium conical, sometimes undulant at base; styles erect or recurved; mericarps with 5 conspicuous ribs; canals under valliculae inconspicuous in ripe fruit, sometimes 1 narrow canal in each rib, 2 at commissure or canals obsolete; pericarp with annular sclerenchymatous tissue or parenchymatous; albumen dorsally inflated in cross section, sloping-concave at commissure. Perennials with bipinnate leaves.

Monotypic genus, in the mountains of W. Tien Shan.

1. *K. turkestanica* Korov. in Tr. Turkestan. Nauchn. obshch. I (1923) 65. — Ic.: Korov., *ibid.*, Figure 1.

Perennial; entire plant glabrous, glaucous; root thick, vertical, root neck covered with brown scale-like remnants of leaves; stems 20 cm, sometimes to 40–60 cm high (var. *altissima* Korov.), branching from base, the lower branches alternate, the upper whorled, in groups of 3, exceeding central umbel; radical leaves oblong, 5–6 cm long, ca. 2 cm wide, bipinnatisect, the petioles shorter than the blade, expanding at sheath, primary lobes linear, sessile, remote, terminal lobes elliptic, 2 mm long, 1.5 mm wide or linear (var. *altissima* Korov.); cauline leaves few,

* After B.M. Kozo-Polyanskii, corresponding member of the Academy of Sciences of the USSR and professor at Voronezh University, who greatly advanced the study of the Umbelliferae.

smaller, sessile on oblong sheath, uppermost with obsolete blade. Umbels of 7-18 smooth, unequal rays, considerably elongating and slightly thickening in fruit; central umbel larger than the lateral; involucre 0 or of 1-4 caducous lanceolate-subulate leaflets; umbellets 15-flowered; involucels of 5-7 lanceolate-linear leaflets; all flowers in central umbel fertile, in lateral umbels either all flowers staminate or some fertile; calyx-teeth lanceolate, not hardening; petals ovate, notched, with inward curved tip; fruit ovoid or subprismatic, 4-5 mm long, 3 mm wide, 8-faceted in cross section, glabrous; mericarps with slightly protruding ribs. Fl. June, Fr. July-August. (Plate XIVa, Figure 1; Plate XV, Figure 6.)

Solonetzic soil. - Centr. Asia: T. Sh. (W.). Endemic. Described from Talass Ala-Tau. Type in Tashkent.

Genus 967. **FUERNROHRIA*** C. Koch

C. Koch in Linnaea, XVI (1842) 356; Boiss. Fl. or. II, 920

192 Calyx-teeth inconspicuous; petals white, obcordate, deeply notched, with inward curved tip; fruit ovoid, slightly compressed laterally, with cork-like pericarp; stylopodium short-conical; styles short, divergent; mericarps with filiform dorsal ribs and inconspicuous or protruding lateral ribs. Perennial herbaceous plant, the leaves bi- or tripinnate, with setiform lobes.

Monotypic genus, endemic to the Caucasus.

1. *F. setifolia* C. Koch in Linnaea, XVI (1842) 356; Boiss. Fl. or. II, 920; Grossg., Fl. Kavk. III, 139. - *Coriandrum setifolium* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 147. - Exs.: Pl. orient. exs. No. 163; Herb. Fl. Cauc. No. 434.

Perennial; plant entirely glabrous; root fusiform, 0.4-0.8 cm thick; its neck covered with dark brown remains of dead leaves; stem single, erect, 25-50 cm high, simple or branching above; radical leaves early withering, lanceolate, 3.5 cm long, 0.5-2 cm wide, bi- or tripinnatisect, on petiole nearly as long as blade; lobes setiform, 3-6 mm long, with cartilaginous tip; cauline leaves similar to the radical, sessile on expanded sheath; upper leaves smaller, with longer lobes (to 1.5 cm). Umbel 3-7 cm across, of 7-13 smooth rays; involucre of 7-9 narrowly linear or subsetiform upward-pointing leaflets $\frac{1}{3}$ to $\frac{1}{2}$ the length of the rays, sometimes 3-partite; umbellets ca. 1 cm across; leaflets of involucels setiform, 3-5, shorter than umbellet rays; calyx-teeth inconspicuous; petals white, obcordate, deeply notched, with inward curved tip; fruit ovoid, 3-5 mm long, 1.5 mm wide; dorsal ribs filiform, sometimes indistinct, the lateral protruding; stylopodium short-conical; styles short (0.5 mm long in fruit), divergent or recurved. July. (Plate XV, Figure 7; Table XVII, Figure 4.)

Mountain meadows, sometimes dampish. - Caucasus: Cisc., E. and S. Transc. Endemic. Described from Darachichag. Cotype in Leningrad.

* After A.E. Fuernrohr, professor at the Regensburg Lyceum and author of the "Regensburg Flora" (born 1804, died 1861).

Genus 968. **SCHRENKIA** * Fisch. et Mey.

Fisch. et Mey. in Schrenk, Enum. pl. nov. I (1841) 65.— Lipskya Nevski in Tr. Bot. inst. AN SSSR, ser. I IV (1937) 272

Calyx of 5 lanceolate teeth, persistent in fruit; petals white, broadly ovate, hardly notched, with inward curved tip; fruit geminate, with flattened stylopodium and divergent or recurved styles; mericarps subglobose, 193 glabrous or villous; dorsal ribs protruding or indistinct; dorsal canals absent, sometimes 4–5 very narrow canals at commissure. Perennial herbs, with bi- or tripinnate leaves.

Seven species, Central Asia, SW Altai and Sinkiang.

- | | | | |
|----|--|----|---|
| 1. | Involucre 0 | 5. | <i>S. vaginata</i> (Ldb.) Fisch. et Mey. |
| + | Involucre of 7–15 leaflets | 2. | |
| 2. | Fruit densely covered with long villous excrescences | 3. | |
| + | Fruit smooth or scabrous, without long villi | 4. | |
| 3. | Fruit large, 7 mm long, 10 mm wide; umbels of 10–15 rays | | 1. <i>S. insignis</i> Lipsky. |
| + | Fruit 5 mm long, 7 mm wide; umbellets of 15–25 rays | | 2. <i>S. papillaris</i> Rgl. et Schmalh. |
| 4. | One central flower of umbel fertile, the rest sterile; stems in lower part densely covered with petioles of dead leaves | | 7. <i>S. kultiassovii</i> Korov. |
| + | All or nearly all flowers fertile | 5. | |
| 5. | Leaflets of involucre and involucels lanceolate, with broad scarious margin; leaf lobes of the last order ovate, mucronate | | 6. <i>S. pungens</i> Rgl. et Schmalh. |
| + | Leaflets of involucre and involucels linear, without scarious margin; leaf lobes of last order linear | 6. | |
| 6. | Plant 15–30 cm high; terminal leaf lobes 5 mm long, 0.5 mm wide (Syr D., Pam.-Al., T. Sh.). ... | 3. | <i>S. golickeana</i> (Rgl. et Schmalh.) B. Fedtsch. |
| + | Plant 25–50 cm high; terminal leaf lobes 5–10 mm long, 1–2 mm wide | 4. | <i>S. involucrata</i> Rgl. et Schmalh. |

Section 1. LIPSKYA K.-Pol. in Fl. Az. Ross. XV (1920) 73.— Genus Lipskya Nevski in Act. Inst. Bot. Ac. Sc. USSR, ser. I, IV (1937) 272.— Fruit large, 7 mm long, 10 mm wide, with truncate base; commissure as long as fruit; calyx persistent in fruit.

1. *S. insignis* Lipsky in Tr. Bot. Sada, XVIII (1900) 73.— Anidrum insigne K.-Pol. in Tr. Bot. Sada, XXXVI (1920) 75.— Lipskya insignis Nevski in Tr. Bot. Inst. AN SSSR, ser. I, IV (1937) 272.—

194 Perennial; root thick, its neck covered with remnants of dead leaves; entire plant smooth or scattered spiny-scabrous; stems 20–25 cm high, erect, deeply sulcate, branching; radical leaves on long petioles expanding to broad sheath, their blades oblong or oblong-lanceolate, tripinnatisect;

* After A. I. Shrenk who made extensive collections on four expeditions to Central Asia (1840–1843). These are now housed in the V. L. Komarov Botanical Institute of the Academy of Sciences of the USSR.

lobes of the last order lanceolate, with few acute teeth or pinnatifid; upper leaves smaller, less dissected. Umbels of 10–15 unequal, 2–7 cm long, acutely faceted rays; involucre multifoliate, of lanceolate-linear, entire or elongate, pinnatisect, sometimes dentate leaflets; involucels of many lanceolate, entire leaflets with scabrous margins; umbels with sessile pistillate central flower and staminate marginal flowers, on rather long pedicels; calyx-teeth lanceolate, large, subulate, persistent in fruit; fruit geminate, 7 mm long, 10 mm wide, slightly laterally compressed; mericarps subglobose, covered with villi, with 3 dorsally protruding ribs; canals 0; carpophore not splitting; stylopodium flattened; styles recurved. May.

Herbaceous slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Yakkabag (W. Bukhara). Type in Leningrad.

Section 2. EU-SCHRENKIA K.-Pol. in Fl. Az. Ross. XV (1920) 75. — Fruit cordate, deeply notched at base; mericarps touching only at tip; height of commissure nearly half its diameter, $\frac{1}{4}$ – $\frac{1}{2}$ the height of the fruit; lateral ribs arcuate.

Series 1. Papillares K.-Pol. in Bull. Soc. Nat. Mosc. N.S. XXIX (1915) 147 and in Fl. Az. Ross. XV, 75. — Fruit covered with papilliform excrescences, verrucose, or scabrous from soft villi. Umbellets of main umbel with 1 or 2 rows of staminate flowers surrounding bisexual and pistillate ones. Lateral umbels predominantly staminate, rarely with few pistillate flowers.

2. *S. papillaris* Rgl. et Schmalh. in Tr. Bot. Sada V, 2 (1878) 608. — Sch. ugamica Korov. in Bot. Mat. gerb. Inst. Bot. i Zool. AN UzSSR, XII (1948) 14. — *Anidrum papillare* K.-Pol. in Bull. Soc. Nat. Mosc. N.S. XXIX (1915) 147 and in Fl. Az. Ross. XV (1920) 78.

195 Perennial; root thick (to 3 cm), multicipital above, covered with dark brown, longitudinally splitting remnants of sheaths; stems few, 20–40 cm high, branching, obtusely ribbed, glabrous; leaves oblong, 12–25 cm long, 2–5 cm wide, bi- or nearly tripinnatisect; terminal lobes acute or mucronate, 2–5 mm long, 0.3–0.7 mm wide; petioles abruptly expanding at base, more or less inflated amplexicaul sheath. Umbels 3–5 cm across, of 15–25 scabrous, unequal, ribbed rays; involucre of many linear, recurved, entire or pinnate leaflets, becoming deciduous in fruit; involucels of 7–9 narrowly linear, sometimes subfiliform, thinly acuminate leaflets nearly as long as rays; calyx-teeth triangular-lanceolate, small; petals broadly elliptic, 2 mm long, tapering at base to short claw, notched, with inward curved tip; stylopodium short-conical; styles recurved, longer than stylopodium; fruit geminate, 6–7 mm wide, 5 mm high; mericarps subglobose, densely covered with long villi. Fr. July.

Stony slopes and red sandstones. — Centr. Asia: T. Sh. (W.). Endemic. Described from Boroldai. Type in Leningrad.

3. *S. golickeana* (Rgl. et Schmalh.) B. Fedtsch. in O. and B. Fedtsh., *Perechen' rast. Turkest. III* (1909) 125. — *Sch. syrdarjensis* Lipsky in *Tr. Bot. Sada*, XXIII (1904) 160, p.p. — *Sch. involucrata* Rgl. et Schmalh. in *Tr. Bot. Sada*, V, 2 (1878) 606, ex p. — *Sch. fasciculata* Korov. in *Bot. Mat. gerb. Inst. Bot. i Zool. AN UzSSR*, XII (1948) 15. — *Daucus goliokeanus* Rgl. et Schmalh., *ibid.* 599. — *Anidrum golickeanum* K.-Pol. in *Bull. Soc. Nat. Mosc. N.S. XXIX* (1915) 147; Kozo-Pol. in *Fl. Az. Ross. XV* (1920) 75. — *Bifora golickeana* K.-Pol. in *Bull. Soc. Nat. Mosc. N.S. XXIX* (1915) 147, in adn. — Exs.: H. F. A. M. No. 317.

Perennial; stems erect, 15–30 cm high, branching from base or middle, cylindrical, strongly ribbed, with glabrous or finely scabrous ribs; cauline leaves oblong, bi- or tripinnatisect, the short petiole expanded to amplexicaul sheath; terminal lobes narrowly linear, to 5 mm long, ca. 0.5 mm wide, with short mucro. Umbels of 15–20 unequal, scabrous rays; involucre multifoliate, of 10–12 unequal, linear-lanceolate, usually recurved, entire or pinnatisect leaflets shorter than umbel rays; involucels of many linear-subulate, entire leaflets nearly as long as or longer than the thinly pubescent peduncles, rarely leaflets with denticulate apex; calyx-teeth rather large, lanceolate, acuminate; petals white, rounded-obovate, with inward curved tip; stylopodium pyramidal-conical at base; styles with capitate stigma erect, becoming divergent, longer than stylopodium; fruit with prominent ribs furnished with spines when young, later entirely glabrous. May–June.

Pebbly and steppe slopes, rarely among crops. — Centr. Asia: T. Sh., Syr D., Pam.-Al. Endemic. Described from Syr Darya after collections of Golick. Type in Leningrad.

4. *S. involucrata* Rgl. et Schmalh. in *Tr. Bot. Sada*, V, 2 (1878) 606, p.p. — *Sch. songarica* Lipsky in *Tr. Bot. Sada*, XXIII (1904) 163. — ? *Sch. vaginata* Ldb. *Fl. Ross. II*, 336, ex p. — *Anidrum involucratum* K.-Pol. in *Fl. Az. Ross. XV* (1920) 83.

Perennial; stem rather thick (0.5–0.8 cm), 25–50 cm high, ribbed, with scabrous ribs, branching from base, the branches alternate below, whorled above; radical leaves not known; cauline leaves broadly ovate, sessile on strongly expanding, inflated sheaths, bi- or nearly tripinnate, smooth; terminal lobes 3–10 mm long, 1–2 mm wide, with very short mucro. Umbels of 10–20 unequal, scabrous rays thickening in fruit; involucre of 7–10 linear recurved or prostrate, acuminate leaflets, shorter than rays; involucels of 7–8 linear upright acute leaflets nearly as long as or much shorter than the smooth umbel rays, rays thickening in fruit; fruit geminate, 3 mm long, 4 mm wide, scabrous, cylindrical-ribbed. Fr. June.

Dry slopes. — Centr. Asia: Balkh. (Lake Balkhash, Khantau). Endemic. Described from the Khantau River valley. Type in Leningrad.

Series 2. *Dyctiariae* K.-Pol. in *Bull. Soc. Nat. Mosc. XXIX* (1915) 147. — Fruit smooth or wrinkled. Usually all flowers fertile.

5. *S. vaginata* (Ldb.) Fisch. et Mey. in Schrenk, *Enum. pl. nov. I* (1841) 65; Ldb. *Fl. Ross. II*, 366; Kryl., *Fl. Zap. Sib. VIII*, 2031. — *Cachrys vaginata* Ldb. *Fl. alt. I* (1829) 366. — *Anidrum vaginatum* K.-Pol.

in Bull. Soc. Nat. Mosc. N.S. XXIX (1915) 147; Kozo-Pol. in Fl. Az. Ross. XV, 80. — Ic.: Ldb. Ic. pl. Ross. I, tab. 9. — Exs.: Bornm. Pl. turkest. exs. a. 1913, No. 369, 433.

Perennial; root vertical, ca. 1 cm across, its neck covered with remnants of stiff wide dead sheaths, branching from middle or base, lower branches alternate, the upper whorled or opposite; radical leaves numerous, stiff, oblong, 5–18 cm long, 1.5–3 cm wide, bipinnate, with opposite sessile lobes; petiole 1–3 cm; secondary lobes deeply dissected into ovate-lanceolate or lanceolate, subulate-acuminate lobules, 1–5 mm long, 0.5–1.5 mm wide; 197 upper cauline leaves smaller, less dissected, sessile on short oblong sheaths. Umbels 5–10 cm across, of 10–20 irregular smooth rays; general involucre 0; umbellets many-flowered, ca. 1 cm across; pedicels unequal, median flowers sometimes subsessile; involucels of 8–10 linear-lanceolate, finely acuminate leaflets with white-scarious margins, 1–4 mm long; petals rounded-ovate, hardly notched, with narrow inward curved point; fruit geminate, ca. 3 mm long, 4 mm wide, smooth, with many brownish longitudinal striae. May.

Stony steppes, pebbly slopes. — W. Siberia: Alt. (Kaldzhir River basin); Centr. Asia: Balkh., Dzu.-Tarb., T. Sh., Pam.-Al. Gen. distr.: Sinkiang. Described from Dolenkar Mountain. Type in Leningrad.

6. *S. pungens* Rgl. et Schm. in Tr. Bot. Sada, V, 2 (1878) 607. — Sch. syrdarjensis Lipsky in Tr. Bot. Sada, XXIII (1904) 160 p.p. — *Anid-rum pungens* K.-Pol. in Bull. Soc. Nat. Mosc. N.S. XXIX (1915) 147. — *A. vaginatum* β *pungens* K.-Pol. in Fl. Az. Ross. XV (1920) 82. —

Perennial; root thick, multicapital, some reduced stems densely covered with remnants of wide stiff violet sheaths; stems simple or branching, 14–17 cm high, glabrous, obtusely ribbed; leaves glaucescent, narrowly oblong, 5–7 cm long, 1–2 cm wide, bipinnate with remote primary lobes and thickened broad rhachis; lobes of the last order lanceolate or ovate-lanceolate, acute, 1.5–4 mm long, 1–1.5 mm wide; petioles passing abruptly into broad sheaths. Umbels 3–6 cm across, of 11–16 smooth rays; involucre of 7–10 lanceolate-linear, usually reflexed leaflets with slightly scabrous margins; umbellets with few or many fertile rays; leaflets of involucels linear, lanceolate, with whitish, slightly scabrous margins, usually reflexed; fruit geminate, 4–5 mm wide, 2.5 mm high; mericarps subglobose. June.

Pebbly slopes. — Centr. Asia: Syr D., Pam.-Al. (W.), T. Sh. (W.). Endemic. Described from Kara-Tau. Type in Leningrad.

Series 3. *Kultiassoviae* Schischk. — Fruit smooth. Umbels with only 1 fertile flower.

7. *S. kultiassovii* Korov. in Schedis ad Herb. Fl. As. Med. II (1924) 22. — Exs.: H. F. A. M. No. 28.

198 Woody perennial, branching at base; shoots numerous, reduced, herbaceous, sterile or fertile, 15–20 cm high, erect, obtusely ribbed, glabrous, densely covered with brown, subulate, suberect petioles of dead leaves; leaves oblong, ca. 10 cm long, 3–3.5 cm wide, glaucescent,

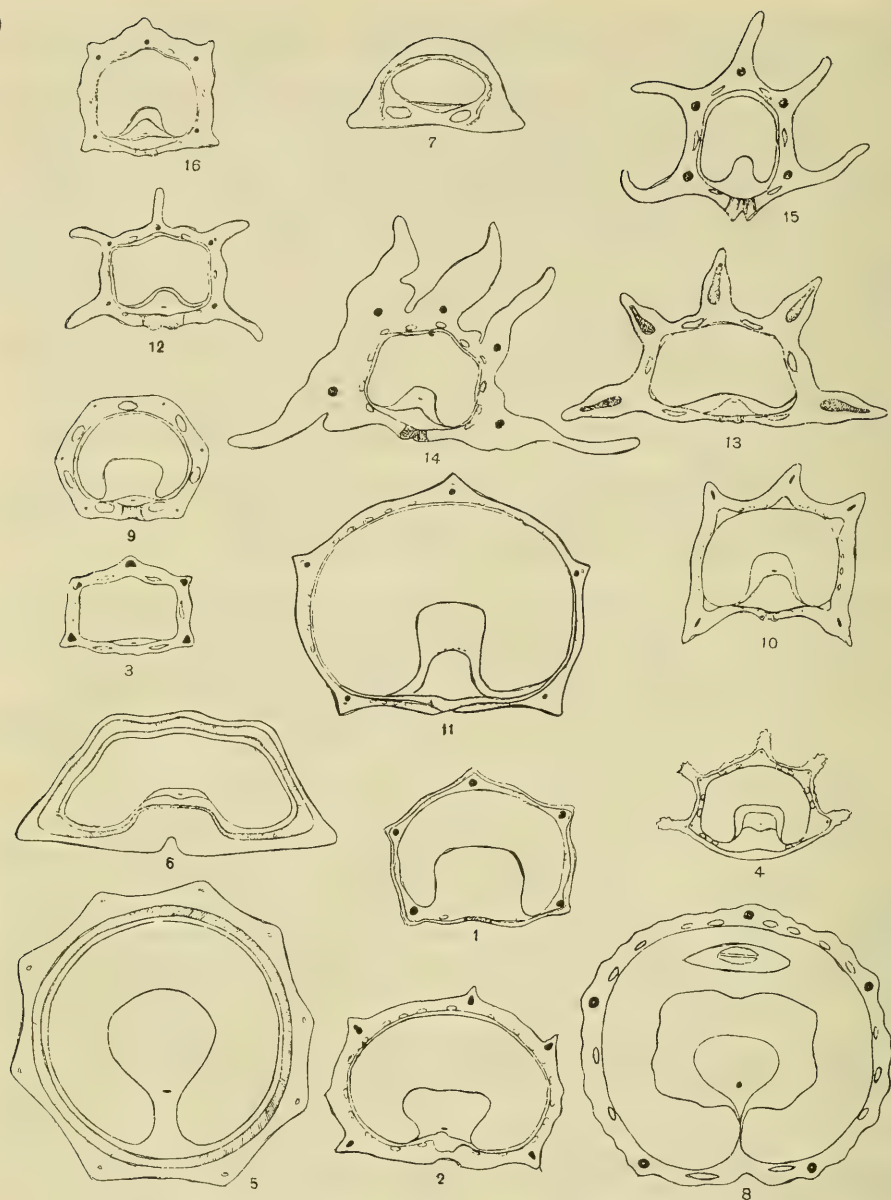


PLATE XV. Transverse section of mericarps (scheme): 1 - *Krasnovia longiloba* (Kar. et Kir). M.Pop.; 2 - *Sphallerocarpus gracilis* (Bess.) K-Pol.; 3 - *Grammosciadium daucoides* DC.; 4 - *Albertia paleacea* Rgl. et Schmalh.; 5 - *Schtschurovskia meifolia* Rgl. et Schmalh.; 6 - *Kosopoljanskia turkestanica* Korov.; 7 - *Fuernrohria setifolia* C.Koch.; 8 - *Danaa denaensis* (B. Fedtsch.) Schischk.; 9 - *Korshinskya olgae* (Rgl. et Schmalh.) Lipsky.; 10 - *Hymenolaena pimpinellifolia* Rupr.; 11 - *Eleutherospermum cicutarium* (M.B.) Boiss.; 12 - *Aulacospermum simplex* Rupr.; 13 - *Cnidium dahuricum* (Jacq.) Turcz.; 14 - *Aulacospermum darvasicum* (Lipsky) Schischk.; 15 - *Aulacospermum anomalum* Ldb.; 16 - *Trachydium kopetdaghense* Korov.

bipinnatisect; primary lobes remote, the secondary pinnatisect into lanceolate-linear or linear-acuminate lobules, 1–2 mm long; petioles short, passing to lanceolate or amplexicaul sheaths. Central umbel larger than the lateral, of 7–11 slightly scabrous or glabrous rays; involucre of 1–6 reflexed subulate, caducous leaflets with nearly spinose tip; umbellets with single fertile flower; involucels of 6–8 linear-subulate, appressed or prostrate persistent leaflets with scabrous margins; sepals lanceolate, persistent; petals ovate, notched, with obtuse inward curved tip; fruit geminate, 6.5–7 mm wide, 3.5–4 mm high; mericarps subglobose, with prominent irregularly arranged ribs; stylopodium conical, tapering to elongate style. July.

Stony mountain slopes. — Centr. Asia: T. Sh. (W.). Endemic. Described from Duany-Tau Mountains. Type in Tashkent.

Genus 969. **BIFORA*** Hoffm.

Hoffm. Umbell. Gen. ed.2 (1816) 191. — Biformis Spreng. Anleit.II, 1 (1817) 635. — *Atrema* DC. Coll. Mém.V (1829) 71. — *Corion* Hoffmgg. et Link, Fl. Port.II (1820) 450. — *Anidrum* Neck. Elem.I (1790) 188, nom. rejic.

Flowers bisexual and staminate, in all umbels; calyx-teeth obsolete; petals similar or the peripheral elongate, white, obcordate, with inward curved lobe; fruit geminate, 2 times as wide as high, markedly constricted at commissure, separating into two subglobose, more or less tuberculate-
 201 rugose or dotted mericarps; 5 main ribs seen as bands; pericarp with woody median layer, parenchymatous only in upper part, near commissure; in ripe fruit canals obliterated; stylopodium conical; albumen strongly curved. Annual glabrous herbs, leaves bi- or tripinnate with pungent odor, lobes linear.

Two species, of the Mediterranean floristic region.

1. Umbels of 2–3 rays; petals 0.75 cm long; fruit very wrinkled; styles 0.2 mm long 1. *B.testiculata* (L.) DC.
- + Umbels of 3–8 rays; petals to 3 mm long; fruit slightly wrinkled; styles 1.4–2 mm long, violet 2. *B.radians* M.B.

Section 1. **EUBIFORA** (Calest.) Schischk. — Genus *Anidrum* sect. *Eubifora* Calest. in *Webbia*, I (1905) 273. — Umbels of 2–3 rays; fruit very wrinkled, truncate; styles nearly as long as stylopodium.

1. *B.testiculata* (L.) DC. Prodr.IV (1830) 249; Boiss. Fl. or.II, 921; Grossg., Fl. Kavk.III, 139. — *B.dicocca* Hoffm. Umbell. ed.2 (1816) 192. — *B.flosculosa* M.B. Fl. taur.-cauc.III (1819) 234. — *B.testicularis* Bub. Fl. Pyren.II (1900) 417. — *Coriandrum testiculatum* L. Sp. pl. (1753) 256. — *C.didymum* Stokes, Bot. Mat. Med.II (1812) 121. — *C.testiculare* Salisb. Prodr. (1796) 166. — *Bioforis flosculosa* Spreng. Anleit.II, 1 (1817) 635. — *B.testiculata* Spreng. l.c.

* From the Latin *biforis* — two-doored (*bis* — twice, *foris* — door), in referring to two perforations in the pericarp, near the commissure.

(1817).— *Corion testiculatum* Hofm. et Link, Fl. Port. II (1820) 457.— *Anidrum testiculatum* O. Kuntze, Rev. Gen. (1891) 264.— *A. flosculosum* Calest. in Webbia, I (1905) 273.— Ic.: Fedch. and Fler., Fl. Evrop. Ross. 681.

Annual; plant entirely glabrous; stems 10–25 cm high, angular, branching from base or only above; radical and lower cauline leaves on more or less long petioles with sheaths, blades ovate or ovate-oblong, 3–4 cm long, 1.5–2 cm wide, bipinnatisect; primary lobes broadly ovate, short-petioled, pinnatifid into ovate-cuneate dentate lobules; median and upper leaves with narrow linear acute lobes. Umbels of 2–3, 5–7 mm long smooth rays; involucre and involucels 1-leaved or absent; umbellets of 2–3 fertile flowers; petals white, 0.75 mm long; fruit geminate, 2.5 mm long, 5 mm wide, notched at base, very wrinkled; stylopodium short-conical; styles very short. April. (Plate XVII, Figure 3.)

- 202 Among crops.—Caucasus: Dag., E. Transc. (former Karyagino District [now Fizuli]) Tal.; Centr. Asia: Mtn. Turkm. (introduced?). Gen. distr.: W. and E. Med., Bal.-As. Min. Described from S. Europe. Type in London.

Section 2. ASTROBIFORA (Calest.) Schischk.—Genus *Anidrum* sect. *Astrobifora* Calest. in Webbia, I (1905) 273.—Umbels of 3–8 rays; fruit slightly wrinkled; styles nearly 10 times as long as stylopodium.

2. *B. radians* M. B. Fl. taur.-cauc. III (1819) 233; Ldb. Fl. Ross. II, 365; Boiss. Fl. or. II, 922; Shmal'g., Fl. I, 429; Grossg., Fl. Kavk. III, 139.—*Coriandrum testiculatum* L. Sp. pl. ed. 2 (1762) 1448, p. p.—*C. radians* Prantl, Exkursionfl. Bayern (1884) 292.—*Biforis testiculata* Roth, Enum. Pl. Phanerog. Germ. I (1827) 888, nec Spreng.—*Anidrum radians* O. Ktze. Rev. Gen. (1891) 274; Kozo-Pol. in Fl. Az. Ross. XV, 116.—Ic.: Rchb. Ic. Fl. Germ. XXI, Taf. 2042.

Annual; root thin, fusiform; stem 25–60 cm high, simple, sulcate, branching nearly from base, stems and leaves glabrous; leaves bi- or tripinnate, the lower sometimes pinnate, with linear, entire, acute, lobes; upper leaves sessile on expanded sheaths, with filiform or capilliform lobes. Umbels of 3–8 thin, to 2.5 cm long rays; involucre 0 or 1-leaved; umbellets 7–9-flowered, peripheral flowers bisexual, with expanded petals, the inner staminate, somewhat smaller, with nearly equal petals; petals white, the peripheral 2–4 mm long; involucels one-sided, with 2–3 subulate-filiform leaflets; fruit ca. 3 mm long, 6 mm wide, very thinly granularly wrinkled, notched at base and summit; stylopodium nearly obliterated in ripe fruit; styles filiform, ca. 1.5 mm long (half the diameter of the mericarp), simple at first, becoming appressed to fruit; stigma capitate. May–June. (Plate XVII, Figure 2.)

Fields, gardens, vineyards.—European part: Crim., Bl., U. Dns.; Caucasus: Dag., E., W. and W. Transc. Gen. distr.: Med., As. Min. (Artvin and others), Iran.; introduced in Centr. Eur. and N. Am. Described from the Crimea. Type in Leningrad.

Tribe 4. SMYRNIEAE Koch, Umbell. (1824) 133.—Flowers bisexual; calyx-teeth obsolete or very small; petals often clawed; stylopodium

short-conical or flat or broadly inflated; fruit cylindrical, often compressed laterally; primary ribs 5 per mericarp, filiform, protruding or narrowly winged; fruit often constricted at commissure, sometimes nearly geminate; canals encircling seed or 1-4 in valliculae; albumen crescent-shaped or horseshoe-shaped in cross section with more or less deep furrow; pericarp usually smooth; crystals absent near commissure.

Genus 970. **ASTOMATOPSIS*** Korov.

Korov. in Bot. Mat. Gerb. Inst. Bot. i Zool. AN UzSSR, XII (1948) 29

Flowers polygamous; calyx-teeth obsolete; petals white, elliptic, with constricted inward curved tip; stylopodium appressed-conical; fruit geminate; mericarps curved, constricted at commissure, with obscure or filiform ribs; canals numerous, obliterated in fruit; carpophore aborted; pericarp thin, coriaceous; albumen concave at commissure. Perennial herbs with deeply buried tuber, and tripinnate or biternate leaves.

One species, in W. Pamir-Alai.

1. *A. galiocarpa* Korov. in Bot. mat. Gerb. Inst. Bot. i Zool. AN UzSSR, XII (1948) 30.

Perennial; tuber subglobose, 0.8 cm across, 0.5-3 cm below the surface; stem single, 10-20 cm high, glabrous, branching or nearly simple; radical leaves solitary, the thin petiole longer than blade, blade nearly bipinnatisect, ovate, 2.5 cm long, 1.5 cm wide, with few oblong lobes 6-10 mm long, ca. 2 mm wide, acute and glabrous above; cauline leaves few, the lower nearly simple-pinnate, their petioles gradually expanding into oblong scarious sheath; upper leaves sessile on sheath, cut nearly to base into narrow lanceolate or linear, acute lobes. Umbels of 2-5 nearly uniformly thin short glabrous rays, elongating in fruit, umbels 1.5-2 cm long in flower, to 6 cm in fruit; involucre 0, or of 2-3 filiform or narrowly lanceolate leaflets sometimes exceeding umbellets; calyx-teeth obsolete; petals white, obcordate, ca. 1 mm long, with shallow or deep notch, tapering to short claw; stamens curved or suberect, $1\frac{1}{2}$ to 2 times as long as petals; anthers small, ovoid, white; unripe fruit glabrous, obscurely geminate, 1.5 mm long, 2 mm wide; stylopodium short-conical; style recurved, twice as long as stylopodium. July-August.

204 Pebbly and stony slopes in alpine zone.— Centr. Asia: Pam.-Al.

Endemic. Described from Tupalang River valley on Gissar Range. Type in Tashkent.

* Derived from *Astoma*, another genus of the family, and the Greek *opsis* — appearance.

Flowers bisexual; calyx edentate; petals white, rarely slightly violet, equal, obovate, concave along midrib, without distinct claw, notched or incised, with short inward curved tip; stylopodium more or less conical or disciformly flattened; styles short, curved; fruit globose to cylindrical, without distinct ribs; commissure narrow; resinous canals 1 per vallecule, large, sometimes 3-5-6, in the latter case narrow, interrupted, sometimes obliterated in ripe fruit; carpophore split above, pericarp thin, without stereomes, close to ribs with outer layer of radially elongated transparent cells; albumen of seed flat or concave inside, rarely more or less furrowed. Annual, 1-, rarely 2-stalked, monocarpic herbs, with hypocotyl tuber at ground level; umbels with involucre and involucl; embryo with 2 cotyledons.

Twenty-two species in the Mediterranean area, from Asia Minor to Tarbagatai in Central Asia. Many of the species grow in the USSR. Most of the Central Asian species grow in the southern provinces. *S. setacea* (Schrenk) Korov. alone extends northwards, to the western spurs of Tarbagatai, where it often forms thickets in the mountainous parts, from the low foothills right up to the subalpine belt.

Economic significance. *S. allioides* (Larin) is mentioned in the literature for its food value. In this respect *S. alaica* and *S. hirtula* are also valuable. *S. allioides* was found to contain to 0.11%, and *S. hirtula* to 0.19% essential oils of unknown composition (Kudryashev).

Note. Experiments with many of the Central Asian species, carried out in Tashkent, have shown good germination and acclimatization. Moisture was found to affect growth. When favorable, the plants develop as biennials; when not their life-cycle lasts from 3-5 years. Both in cultivation and in nature the leaves shed quickly.

Though their practical value has been little studied, species of *Scaligeria*, especially *S. tschimganica* (umbels), are worthy of attention as sources of essential oil, starch and food, and as ornamentals. Because of their high adaptability all members of the genus are recommended for artificial grass reseeding in arid areas by seeds or annual tubers (fall sowing).

- | | | |
|----|--|--------------------------------|
| 1. | Fruit rounded when viewed laterally or more or less ovoid | 2. |
| + | Fruit linear when viewed laterally; umbels axillary | |
| | 18. <i>S. tschimganica</i> Korov. | |
| 2. | Fruit globose | 3. |
| + | Fruit ovoid | 5. |
| 3. | Umbels many-rayed (25-28); leaflets of involucl broadly lanceolate or oval; petals nearly flat | 13. <i>S. polycarpa</i> Korov. |
| + | Umbels of 2-8 rays; leaflets of involucl lanceolate or oblong . . . | 4. |
| 4. | Umbels of 2-5 rays (Pam.-Al.) | 1. <i>S. bucharica</i> Korov. |

* Treatment by E.P. Korovin.

** After J.C. Scaliger (1484-1558), physician and teacher in Agen, France, an interpreter of the works of Theophrastus and Aristotle regarding plants.

- + Umbels of 5-8 rays (Kopet-Dagh) 2. *S. kopetdaghensis* (Korov.) Schischk.
5. Leaflets of involuclers oval or oblong-oval, concave 6.
- + Leaflets of involuclers narrower lanceolate to setiform 8.
6. Fruit scabrous, covered with short papillae, fertile umbels compact; tuber spherical 11. *S. allioides** (Rgl. et Schm.) Boiss.
- + Fruit smooth 7.
7. Umbels in corymbiform branches; tuber oblong 12. *S. glaucescens* (Dc.) Boiss.
- + Umbels in paniculate branches; tuber oval 6. *S. platyphylla* Korov.
8. Stems distinctly inflated at nodes; ovary distinctly ribbed 3. *S. lipskyi* Korov.
- + Stems more or less cylindrical, not inflated at nodes 9.
- 206 9. Leaves manifoldly dissected into filiform or narrowly linear lobes 10.
- + Terminal lobes, especially of radical leaves, oval or more or less lanceolate, incised or dentate 13.
10. Tuber cylindrical; stem more than 1 m tall; fruit up to 3.2 mm long 8. *S. ugamica* Korov.
- + Tuber ovoid or spherical; stem not exceeding 0.5 m 11.
11. Branches corymbiform; leaflets of involuclers and involuclers resembling bristles 19. *S. setacea* (Schrenk) Korov.
- + Branches paniculate; leaflets of involuclers and involuclers lanceolate 12.
12. Rays of umbels numerous (10-15); leaves dissected, sections 3-7 mm long; tuber spherical 7. *S. alaica* (Lipsky) Korov.
- + Rays of umbels few (3-5); terminal sections of leaves $\frac{1}{3}$ of their length; tuber more or less oblong 9. *S. korovinii* Bobr.
13. Umbels on corymbiform branches; umbel rays nearly equal 14.
- + Branches paniculate; umbel rays of unequal length 17.
14. Stem hollow, smooth, with glaucous bloom; leaves thrice dissected into linear-lanceolate sections 15. *S. ferganensis* Lipsky.
- + Stems not hollow, distinctly sulcate-ribbed; leaves of a different shape 15.
15. Plant 40-50 cm high, sometimes scabrous from short hairs; lower leaves pinatisect into oval, incised-dentate sections; umbel rays 3-5 cm long; tall plants of the foothills 14. *S. hirtula* (Rgl. et Schm.) Lipsky.
- + Plant 30-40 cm high; leaves bipinnatisect into lanceolate, trifid sections; umbel rays 2-4 cm long 16.
16. Flowers white; stems sulcate; umbels with spreading rays; resinous canals numerous, narrow, persistent in ripe fruit; plants of dry sandy hills 17. *S. transcaspica* Korov.
- + Flowers faintly purple turning white; stems smooth below, slightly sulcate above, umbels with declinate rays; canals in pericarp inconspicuous; plants of high mountain belt 16. *S. korshinskyi* (Lipsky) Korov.

* In the mountains of Kara-Tau there occurs *S. karavatica*, closely related to *S. allioides*, from which it differs by a lobate tuber, 2-3 stems, and a more xeromorphous habit. As no specimens are available it has not been included here.

17. Stylopodium conical, massive 18.
 + Stylopodium flattened-conical; each furrow with 3 equal canals;
 leaves pinnatisect into narrowly lanceolate, partite sections
 207 18. Leaves pinnatisect into small, cylindrical, acutely toothed sections;
 umbels 10-flowered; fruit distinctly compressed dorsally, gray;
 each furrow with 3-4, unequal resinous canals
 10. *S. samarkandica* Korov.
 + Leaves bipinnatisect into small, oblong-lanceolate, 2-3-lobed
 sections; umbels 20-flowered; fruit cylindrical, brown; each
 furrow with numerous narrow, resinous canals ... 4. *S. knorringiana* Korov.
 5. *S. conica* Korov.

Subgenus 1. *Eueleosticta* Korov. — Seeds flat or concave inside.

Section 1. *PANICULATAE* Korov. — Umbels on paniculate branches.

1. *S. bucharica* Korov. in Bot. mat. Gerb. Fl. Bot. Sada, V, 1, 5 (1924)
 79; in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 32. — Ic.: l.c. (1928)
 tabl. 1, Figure 2.

Perennial; smooth glaucescent plant, with ovoid, turnip-shaped root;
 stem to 80 cm tall, whitish, thinly sulcate, branching from middle to form
 spreading panicle of thin leafless branches; cauline leaves with amplexicaul
 petioles; blade tripinnatisect into short-petiolate sections pinnatipartite
 in turn into broadly linear, acuminate lobes; upper leaves with lanceolate-
 subulate sheath; umbels 2-7 cm across, of 3-9 spreading, unequal rays;
 leaflets of involucre 2-5, short, lanceolate-linear, unequal; umbellets 5-
 10-flowered, involucre often of 5 unequal leaflets; petals 1 mm long, elliptic,
 with short inward curved tip; stylopodium flattened-conical; fruit globular,
 geminate, 1.6 mm across; mericarps subrounded in cross section, smooth,
 with rather broad commissure; 3 resinous canals occupying each furrow,
 4 broad canals at commissure. June-July.

Grows on loose weathering products of gypsiferous sandstones, in lower
 mountain belt, dry slopes in higher belts. — Centr. Asia: Pam.-Al. (Shugnan,
 Gissar Range, Babatag Mountains). Endemic. Described from Babatag
 Mountains. Type in Leningrad.

2. *S. kopetdaghensis* (Korov.) Schischk. comb. nov. — *Physospermum*
kopetdaghense Korov. in Bot. mat. Gerb. Fl. Bot. Sada, V (1924) 84. —
 Exs.: P. Sintenis, Iter transcasp.-pers. 1900-1901, No. 572.

208 Perennial; root thickened, tuberiform, ovoid, its neck covered with dark
 brown fibrous leaf-remnants; stem single, 50-100 cm high, erect, sulcate,
 branching nearly from base, glabrous, often faintly violet; radical leaves
 early withering, glabrous, petioles long sheathing, nearly tripinnatisect,
 triangular-ovate, 5-9 cm long, 4-8 cm wide; primary lobes petioled,
 secondary sessile, ovate, dissected into oblong rounded lobules; cauline
 leaves crowded below, similar to radical but smaller. Umbels 1.5-6 cm
 across, of 5-7 unequal, glabrous acutely ribbed rays; umbellets 9-11-
 flowered; involucre of 5 oblong-lanceolate leaflets with narrow scarious

margins, acute, erect, $\frac{1}{2}$ to $\frac{1}{5}$ the length of the rays; involucels of 5 leaflets similar to those of involucre; calyx-teeth inconspicuous; petals white, broadly ovate, not notched; fruit geminate, smooth, 1.5 mm long, 2 mm wide, with filiform ribs; stylopodium short-conical; styles divergent, longer than stylopodium. May-June. (Plate XXXIV, Figure 15.)

Dry slopes, near cliffs at 2,100 m. - Centr. Asia: Mtn. Turkm. Endemic. Described from Kopet Dag Range. Type in Leningrad.

3. *S. lipskyi* Korov. in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 34. - Ic.: *ibid.*, tabl. 1, fig. 7.

Perennial; glabrous glaucescent plant; stem nearly 1 m high, branching from base to produce broad spreading panicle, sulcate, slightly thickened at nodes; radical leaves oblong-lanceolate, ca. 25 cm long, like cauline leaves stiff when dry, tripinnatisect into sessile sections, the terminal broadly oval, nearly palmately divided into narrow linear spreading lobules 2.5 mm long, 0.5 mm wide; blade of upper leaves obsolete, lobes slightly longer than blade. Umbels of 1-3 unequal 3-35 mm rays; umbellets dense, 15(10) flowered; leaflets of involucre 3, short-lanceolate; leaflets of involucels 5, oblong-lanceolate, nearly as long as umbellets; petals ovate, with curved tip; ovary oblong, with flattened-conical stylopodium; unripe mericarps distinctly ribbed; resinous canals 3 in each vallecule variously developed. July.

Stony slopes and primary products of their weathering in lower belt. - Centr. Asia: Mtn. Turkm. (Badkhyz). Endemic. Described from Badkhyz. Type in Leningrad.

4. *S. knorringiana* Korov. in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 35. - Ic.: *Ibid.*, tabl. I, fig. 6.

209 Perennial; glaucescent, glabrous plant ca. 1 m high; tuber ovoid; stem erect, twice-thrice paniculately branching above middle, obscurely sulcate; lower leaves oblong-lanceolate, to 15 cm long, 4 cm wide, stiff when dry, pinnatisect, their primary segments opposite, sessile, pinnatisect into rounded, acutely toothed, ca. 3 mm wide lobules; blade of median leaves broader, thinner, upper leaves reduced to short lanceolate sheaths. Umbels of 6-11, approximate, unequal rays to 3 cm long; umbellets 11-12-flowered, with 5 recurved leaflets; leaflets of involucre 5, lanceolate, obtuse; petals 1.5 mm long, concave along midrib, notched, with short inward curved tip; stylopodium conical, with undulant base; fruit oblong-ovoid, slightly compressed dorsally, gray, 2.7 mm long, 1.5 mm wide; mericarps smooth, with narrow commissure; resinous canals variously developed, 3-4 in each vallecule, 6 towards commissure; pericarps with thick outer layer of elongate radial cells. June-July.

Dry clayey hills with gypsiferous serozems and pistachio thickets. - Centr. Asia: Syr D. (eastern half of Fergana Valley), Pam.-Al. (Alai Valley, Pamir?). Endemic. Described from Fergana. Type in Tashkent.

5. *S. conica* Korov. comb. nov. - *Elaeosticta conica* Korov. in Bot. mat. Gerb. Inst. Bot. i Zool. AN UzSSR, XII (1948) 31.

Perennial; plant to 1 m high, pale green, subglabrous, with spherical tuber; stem thin, sulcate, twice branching from middle or higher, lower

branches alternate, the upper opposite; leaves rachis with scabrous margin; radical leaves on long petioles expanding below, their blade subrhombic, primary sections bipinnatisect into small, 2 mm long, oblong-lanceolate 2-3-lobate sections, lobes mucronate; cauline leaves reduced, the upper represented by short sheaths. Umbels of 6-10 spreading, 5-20 mm rays; leaflets of involucre 5, oblong, with parallel nerves; umbellets 20-flowered; involucels of 8-10, oblong-oval, slightly violet leaflets; petals 0.8 mm long, with acuminate inward tip; stylopodium conical; fruit oblong-ovoid, brown, obscurely ribbed, 2.7 mm long; mericarps subcircular; resinous canals narrow, numerous in valliculae; seeds concave. May-June.

Slopes of loose weathered gypsiferous rocks. - Centr. Asia: Pam.-Al. (western spurs of Gissar Range). Endemic. Described from Guzar. Type in Tashkent.

210 6. *S. platyphylla* Korov. in Addenda XV, 426.

Perennial; glaucescent, slightly scabrous plant; root ovoid, ca. 5 mm across; stem 50 cm high, cylindrical, sulcate, thrice branching below middle to produce dense, oval panicle; leaves almost entirely glabrous; petioles of radical leaves expanding at base; cauline leaves sessile, with short triangular sheaths, tripinnatisect into slightly scabrous, 5 mm long filiform sections; terminal leaves and leaves on branches reduced to short, oval-lanceolate, acute sheaths with membranous margins. Umbels numerous on tips of branches and laterally on secondary branches, very short-peduncled, umbels of 5-7 thin, unequal, 5-15 mm rays; involucre of 5 oblong, 3-nerved, almost entirely membranous leaflets; umbellets 10-flowered, involucels of 5-6 membranous, oblong-oval, 3-nerved leaflets as long as pedicels, drooping when ripe; calyx without teeth; stylopodium conical, acuminate; style shorter than stylopodium; fruit oblong-oval in profile about as long as peduncle, light brown, 2.5 mm long; mericarps shiny, rugulose, slightly compressed dorsally without distinct ribs; resinous canals very narrow, 3 between ribs, 6 towards commissure side. Fr. June.

Slopes, among pistachio. - Centr. Asia: Mtn. Turkm. (Badkhyz). Endemic. Described from Kushka area. Type in Ashkhabad.

7. *S. alaica* (Lipsky) Korov. in Tr. Sredneaz. Gos. univ. VIII-b, 2 (1928) 39. - *Carum alaicum* Lipsky in Tr. Bot. Sada, XXII (1904) 127. - *Bunium alaicum* Wolff in Engl. Pflanzenr. IV, 228 (1927) 208. - Ic.: Korov., *ibid.*, tabl. I, fig. 3.

Perennial; plant to 80 cm high, entirely glabrous; tuber spherical, ca. 10 mm across; stem with whitish stripes, paniculately branching nearly from middle, branches mostly simple, rarely with short lateral branches; radical leaves short-petiolate, oblong-lanceolate, thin, repeatedly 3- to 4-pinnatisect into straight filiform, to 7 mm long sections; cauline leaves wider, the upper reduced to lanceolate sheaths. Umbels slightly compressed, often of 10-12 unequal rays to 20 mm long; leaflets of involucre 5-8, linear-lanceolate; umbellets 15-flowered, involucel of 10 short leaflets; petals 1 mm long, obovate, notched, concave at midrib with curved tip, slightly violet becoming white; stylopodium flattened-conical; fruit oblong-ovoid, 2.5 mm long, 1.2 mm wide, without distinct ribs but mericarps prominently 5-angled dorsally; resinous canals inconspicuous in ripe fruit. June-July.

Mountains of steppe and meadow-steppe belt, herbaceous slopes, soft soils, 1,200 to 2,300 m. — Centr. Asia: T. Sh. (Tashkent Ala-Tau, Chatkal Ala-Tau, Kirghiz Ala-Tau, eastern part of Terskei-Ala-Tau), Pam.-Al. (Alai Range, Karategin). Endemic. Described from Alai Range. Type in Leningrad.

Note. This species is not constant throughout its wide distribution area. A form from Karategin with many-rayed umbels — var. *multi-radiata* Korov. (ibid.) — should be separated.

8. *S. ugamica* Korov. in Bot. mat. Gerb. Glavn. Bot. Sada, V, 5 (1924) 6; in Tr. Sredneaz. Gos. univ. VIII-b, 2 (1928) 42. — Ic.: ibid. (1928) tabl. I, fig. 4. — Exs.: H. F. A. M. No. 235.

Perennial; glaucescent entirely glabrous plant exceeding 1 m, with cylindrical tuber; stem sulcate, repeatedly branching above middle to produce spreading panicle; radical leaves with long petioles expanding to sheath; blade oblong-oval, of several divergent sections, the terminal palmatisect into filiform to 5 mm long, soft, early withering lobes; cauline leaves simple, their sections broader; upper leaves reduced to lanceolate sheaths. Umbels of 4–9 unequal, divaricate 1–4 cm rays, sometimes contracted (var. *constricta* Korov., ibid.); involucre of 5 short lanceolate leaflets; petals broadly obovate, 1 mm long, deeply notched, with short, acute inward curved tip; stylopodium flattened-conical; fruit broadly obovoid, smooth, 3.2 mm long, 3 mm wide; mericarps linear in dorsal view; resinous canals narrow, numerous in valliculae and toward commissure; seeds with 2 deep furrows toward commissure. July–August.

Nut forests, on soft, rich brown soils, 1,300–1,450 m. — Centr. Asia: T. Sh. (Tashkent Ala-Tau, Chatkal Ala-Tau), Syr D. (Fergana Valley). Endemic. Described from Ugam Range. Type in Leningrad.

Note. A very close, inadequately studied species is *S. kuramensis* Korov. described from Angren (*Elaeosticta kuramensis* Korov. in Bot. mat. Gerb. Inst. Bot. i Zool. AN UzSSR, XII (1948) 31), differing by wider leaf lobes. This is only known in its vegetative state.

9. *S. korovinii* Bobr. in Addenda XV, 427.

12 Perennial; pale green plant to 45 cm high, entirely glabrous, with oblong-ovoid tuber; stem thinly sulcate, twice branching nearly from base to produce spreading panicle; leaves glaucescent, sometimes slightly violet, oblong, lower leaves on short petioles abruptly expanding at base, bipinnatisect into small, 1.5 mm long, linear-lanceolate, 3-partite sections; blade of cauline leaves markedly reduced, the upper leaves represented by narrow sheaths. Umbels of 3–5 unequal rays to 30 mm long; involucre of 3–5 short lanceolate leaflets; umbellets 10-flowered; leaflets of involucre lanceolate, half the length of the umbellets; petals 1.4 mm long, obovate, with acuminate inward curved tip; stylopodium flattened-conical; ovary oblong, tapering at base; resinous canals numerous, narrow; fruit unknown. June–July.

Steppes and stony slopes in steppe belt. — Centr. Asia: Mtn. Turkm. (Greater Balkhan Range). Endemic. Described from Greater Balkhan Range. Type in Leningrad.

Note. Very close to *S. elata* Boiss. et Hausskn. (from SW Iran), which constitutes together with the preceding two species a continuous complex cycle.

10. *S. samarkandica* Korov. in Tr. Sredneaz. Gos. univ. VIII-b, 2 (1928) 44. — Ic.: *ibid.*, tabl. I, fig. 8.

Perennial; pale green, nearly entirely glabrous plant, with spherical tuber; stem 60–70 cm high, slightly sulcate, twice-thrice branching from middle up to produce a panicle with reduced branches; radical leaves long-petiolate, sparsely tripinnatisect into oblong-lanceolate or oblong sections divided into short, narrow, lanceolate, lobules; cauline leaves oblong-lanceolate to lanceolate, lobules more elongate, upper leaves reduced to sheaths. Umbels 15-flowered, involucre of broadly lanceolate leaflets half the length of the pedicels; petals oval, 1 mm long, slightly notched, with short inward curved tip; stylopodium flattened-conical; ovary broadly ovoid; mericarps subcircular in cross section; resinous canals 3 in valliculae. May–June.

Lower mountain belt. — Centr. Asia: Syr D. Endemic. Described from elevations in the Samarkand area. Type in Tashkent.

Section 2. *CORYMBOSAE* Korov. — Umbels in corymbiform branches, many-rayed, rays usually more or less equal.

11. *S. allioides* (Rgl. et Schmalh.) Boiss. Fl. or. suppl. (1888) 255; Korov. in Tr. Sredneaz. Gos. univ. VIII-b, 2 (1928) 45. — *Conopodium allioides* Rgl. et Schm. in Tr. Bot. Sada, V, 2 (1878) 588. — *Carum allioides* Franchet in Ann. Sc. Nat. s. IV, t. XVI (1883) 293; Lipskii in Tr. Bot. Sada, XXIII (1904) 137. — Ic.: Korov., *ibid.*, tabl. I, fig. 9. — Exs.: H. F. A. M. No. 31.

213 Perennial; green entirely glabrous plant, to 60 cm high, with spherical tuber; stem thinly sulcate, corymbiformly branching in upper part, branches declinate, sometimes with reduced secondary branches; radical leaves 7 cm long, 3 cm wide, short-petioled, oblong-lanceolate, trisect into straight divaricate filiform 3 mm long sections; cauline leaves narrower, upper leaves reduced to narrow lanceolate sheaths. Umbels of 12–25 unequal to 20 mm long rays, contracted after flowering; leaflets of involucre 8–10, lanceolate, acuminate, white, chartaceous, declinate, becoming appressed to rays; umbellets dense, oval, concave, white leaflets of involucre covering umbellets; petals 1 mm long, broadly obovate, cleft for half their length with short acuminate inward curved tip; stylopodium flattened-conical; fruit ovoid, scabrous from small papillae, 1.2 mm long; mericarps subrounded in cross section, without distinct ribs; resinous canals 3 in each vallicula, 6 toward commissure; seeds flat inside. May–June, rarely July.

Loessial hills in low foothill belt, 400 to 700 m, rarely to 2,000 m. — Centr. Asia: Pam.-Al., T. Sh., Mtn. Turkm. (Badkhyz). Gen. distr.: Iran. (N.). Described from mountains between Bugun' and Boroldai, Kokshar and Chotkal. Type in Leningrad.

Note. Within the distribution area of this species, var. *kopet-daghensis* can be separated because of its large fruit, longer pedicels and many-rayed umbels (Kopet Dagh), which bring this species into relation with the following *S. glaucescens* (DC.) Boiss.

12. *S. glaucescens* (DC.) Boiss. Diagn. ser. I, 10 (1849) 51; Fl. or. II, 877; Korov. in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 49, tabl. I, 12; Grossg., Fl. Kavk. III, 140. — *Butinia glaucescens* Boiss. in Ann. Sc. Nat. sér. 3, I (1844) 61. — *Bunium glaucescens* DC. Prodr. IV (1830) 117.

Perennial; glaucescent quite smooth plant with oblong to turnip-shaped tuber; stem to 60 cm high, sulcate, corymbiformly branching in upper part; leaves lanceolate, bipinnatisect, their segments cut into short narrow, setiform sections. Umbels of 10–19 divaricate, 20–30 mm long rays; involucre of 8–10, brownish, lanceolate, nearly entirely scarious leaflets; umbellets 20-flowered; involucels of oval, concave leaflets becoming recurved; petals 1 mm long, broadly obovate, with concave midrib, notched, with inward curved tip; stylopodium flattened; style exceeding diameter of stylopodium; fruit oblong-ovoid, 2.5 mm long, 1.3 mm wide; mericarps subcylindrical in cross section, brown, smooth; resinous canals numerous, narrow; seeds with 2 shallow furrows towards commissure. June–July.

Open communities of phrygana in steppe belt, 1,450 m. — Caucasus: S. Transc. Gen. distr.: Iran. (N.). Described from Sendkhai (Iran). Type in Geneva.

13. *S. polycarpa* Korov. in Bot. mat. Gerb. Gl. Bot. Sada, V 5 (1924) 80; Korov. in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 51. — Ic.: Korov., ibid., tabl. I, fig. 11.

Perennial; whitish, entirely smooth plant, with oblong turnip-shaped root; stem ca. 50 cm high, sulcate, with divergent branches in upper part; radical leaves oval-lanceolate, with petioles expanding at base, bipinnatisect into remote pairs of segments, secondary segments sessile, bipinnatisect into linear, 3–4 mm long, 0.5 mm wide lobules; cauline leaves reduced, upper leaves mere lanceolate, short sheaths. Umbels of 25–27 divaricate 10–20 mm long rays; involucre of 5–8 broad-lanceolate or oblong-oval, 3-nerved, nearly entirely membranous leaflets usually reflexed in ripe umbels; umbellets 15–20-flowered, involucels of 6–8 nearly oval, concave leaflets; petals 1 mm long, obovate, nearly flat, with short tip slightly curved inward; stylopodium flattened; style as long as diameter of stylopodium; fruit subglobular, distinctly geminate, brown, 1.2 mm long, 1.5 mm wide; mericarps round in cross section, smooth or with slightly protruding ribs; resinous canals 3 in each vallecule, inconspicuous in ripe fruit, 4 toward commissure; seeds with 2 furrows toward commissure. June–July.

Soft herbaceous mountain slopes, sometimes thickets in transitional semidesert steppe belt. — Centr. Asia: T. Sh. (Tashkent Ala-Tau), Pam.-Al. (Gissar Range, Karategin, Kugitang Mountains, Mal'guzar Mountains). Endemic. Described from near Kupkat village. Type in Leningrad.

14. *S. hirtula* (Rgl. et Schm.) Lipsky in Tr. Bot. Sada, XXIII (1904) 134; Korov. in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 52. — *Conopodium hirtulum* Rgl. et Schm. in Izv. Obshch. lyub. estestv. antropol. i etnograf. XXXIV, 2 (1881) 28. — Ic.: Korov., ibid., tabl. I, fig. 13.

Perennial; plant pale green, entirely smooth, or more or less scabrous from scattered hairs; tuber spherical; stem angular, deeply furrowed,

- 215 sometimes ribbed, corymbiformly branching above; radical leaves with glabrous or sparingly papillate petioles, blade oval-lanceolate, pinnatisect into incised, acutely toothed sections; cauline leaves bi- or trisect into narrowly lanceolate sections, the upper reduced to narrow sheath. Umbels of 12-35, sulcate, 30-50 mm long rays; leaflets of involucre reflexed; umbellets 35-flowered, involucre of 10 lanceolate, acuminate leaflets; petals 1-1.2 mm long, 1.5 mm wide, in tangential direction, slightly cordate at base, notched, with depressed midrib and short inward curved tip; stylopodium flattened-conical; fruit ellipsoid or ovoid, yellow, 2.2 mm long, 1.5(1.8) mm wide; mericarps subrounded in cross section, smooth, narrowly connate; resinous canals inconspicuous at maturity; seeds furrowed toward commissure. June-July.

Mountain steppes along herbaceous slopes, 800-1,200 m, sometimes to 2,000. - Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from Zeravshan. Type in Leningrad.

15. *T. ferganensis* Lipsky in Tr. Bot. Sada, XXXIII (1904) 136 Korov in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 56. - *Conopodium ferganense* Druce in Rep. Bot. exch. Cl. Brit. Isles (1917) 616. - Ic.: Korov., *ibid.*, tabl. I, fig. 14.

Perennial; plant entirely smooth, glaucescent from waxy bloom; tuber spherical; stem to 150 cm high, rounded, smooth, hollow, corymbiformly branching from middle up; lower leaves with long petioles, oval, bipinnatisect, the terminal sections bipinnatisect into linear or linear-lanceolate, 5-7 mm long sections; cauline leaves tripinnatisect into linear sections, the upper reduced to lanceolate sheaths. Umbels of 10-23 rays, to 3.5 cm long; involucre of 8-9, linear-lanceolate, 3-nerved leaflets; umbellets 20-flowered, involucre similar to involucre; petals broadly obovate, depressed at midrib, notched, with acuminate inward curved tip; stylopodium flattened, pulvinate; fruit broadly ovoid, 3 mm long, its tip distinctly furrowed by prominent ribs; mericarps narrowly connate, dorsally angular, semi-round in cross section; resinous canals 4-5 in vallecule, 10-12 towards commissure; seeds with 2 furrows toward commissure. July-August.

Open mountain meadow slopes, glades in mountain forests, 1,500 to 2,000 m. - Centr. Asia: T. Sh. (Fergana Range from side of Fergana Valley), Pam.-Al. (Gissar Range). Endemic. Described from Yassy and Arslanbob rivers). Type in Leningrad.

- 216 16. *S. korshinskyi* (Lipsky) Korov. comb. n. - *S. hirtula* var. *korshinskii* Korov. in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 56. - *Carum korshinskii* Lipsky in Tr. Bot. Sada, XXIII (1904) 128. - *Bunium korshinskii* Wolff in Enlg. Pflzr. IV, 228 (1927) 208.

Perennial; plant pale green, glabrous or slightly scabrous, with ovoid tuber; stem 30-50 cm high, thin, not hollow, smooth, slightly sulcate in upper part, branching above to produce sparse corymbiform panicle; radical leaves . . . , lower cauline leaves petiolate, oval-triangular, bipinnatisect into linear-lanceolate, 3-partite 5-8 mm long sections, terminal sections of upper leaves linear, entire, resembling short narrow sheaths in upper parts of shoots. Umbels of 10-15, rarely 20 unequal, spreading, 2-4 cm long rays; involucre of 5-7 lanceolate-linear leaflets; umbellets

with 10-15, rarely more flowers; involucels resembling involucre, but leaflets shorter than pedicels; petals sometimes reddish at first, becoming white, obcordate, notched, with inward curved tip, depressed at midrib; stylopodium flattened; fruit ovoid, smooth, 1.5 mm long; mericarps semi-round in cross section; resinous canals inconspicuous, numerous. July-August.

Central Asian juniper to subalpine meadows, open herbaceous mountain slopes. — Centr. Asia: T. Sh. (Tashkent Ala-Tau, Fergana Range), Pam.-Al. (Alai and Gissar ranges). Endemic. Described from Alai Range. Type in Leningrad.

Note. This species is intermediate between *S. ferganensis* and *S. hirtula* but extends beyond them in the mountains. It may be assumed to be a hybrid between these two.

17. *S. transcaspica* Korov. in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 60. — Ic.: Korov., ibid. tabl. I, fig. 14.

Perennial; pale green, entirely smooth plant, with ovoid-globose tuber; stem to 50 cm high, white-striped, deeply sulcate, from middle or below branching to produce corymbiform panicle; lower leaves petiolate, oval-triangular, bipinnatisect into nearly oval petiolate sections to 5 mm long, sections pinnatipartite into linear-lanceolate lobules, 3-lobate above, upper leaves smaller, tapering to narrow sheaths. Umbels of 25 more or less equal, spreading 2-3 cm long rays; involucre of 8 lanceolate, oblique, 1-nerved leaflets; umbellets with more than 30 flowers on unequal pedicels; involucre resembling involucel; petals broadly obovate, 1 mm long, notched, with inward curved tip; stylopodium flattened-conical; fruit yellowish, oblong-elliptic, 2 mm long; mericarps semi-round in cross section, smooth; resinous canals inconspicuous in ripe fruit; seeds with 2 shallow furrows toward commissure. May-June.

Dry sandy hills, among ephemers in mountain semidesert belt. — Centr. Asia: Mtn. Turkm. (Badkhyz hills). Endemic. Described from Badkhyz. Type in Tashkent.

18. *S. tschimganica* Korov. in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 62. — Ic.: Korov., ibid., tabl. I, fig. 16.

Perennial; pale green, entirely smooth plant with spherical tuber; stem to 1 m high, sulcate below, angular above, branching from middle to produce corymbiform panicle; radical leaves long-petioled, nearly oval, bipinnatisect, primary segments sessile, the secondary oblong, pinnatipartite into lanceolate, acute, sometimes incised 1-2 mm wide lobes; cauline leaves simpler, the upper reduced to lanceolate sheath. Umbels flat above, the numerous rays to 47 mm long, shorter toward center; leaflets of involucre 10, linear, sometimes pinnatipartite into few lobules; umbellets 30-40-flowered, on rays of different lengths; involucels of 10-lanceolate-linear, 1-nerved leaflets, as long as umbellets; petals broadly oval, obovate, depressed at midrib, notched, with short inward curved tip, 1.7 mm long; stylopodium short-conical; fruit cylindrical, linear, brown, 3 mm long, strongly fragrant; mericarps not quite circular in cross section, with thin, faintly protruding ribs; resinous canals 2-3 of different sizes in valliculae, 4 toward commissure; seeds nearly flat toward commissure. July-August.

Woody-shrubby belt in open herbaceous habitats, frequently among walnut thickets. — Centr. Asia: T. Sh. (Tashkent Ala-Tau, Fergana Range).

Endemic. Described from Chimgan. Type in Tashkent.

Note. Differs from all other species of the genus by its pungent aroma.

Subgenus 2. *Chaerophylloides* Korov. — Fruit distinctly compressed toward apex; seeds with 2 deep furrows toward commissure.

19. *S. setacea* (Schrenk) Korov. in Tr. Sredneaz. Gos. univ. ser. VIII-b, 2 (1928) 67. — *Carum setaceum* Schrenk, Enum. pl. I (1841) 61; Ldb. Fl. Ross. II, 249; Lipsky in Tr. Bot. Sada, XXIII (1904) 125. — *Bunium setaceum* Wolff in Engl. Pflzr. IV, 228 (1927) 209. — *B. capillifolium* Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 428. — *Conopodium setaceum* Korov. in Bull. Univ. As. centr. VII, Suppl. (1924) 24.

Perennial; slightly scabrous plant, with spherical tuber; stem 50–80 cm high, thinly sulcate, erect, corymbiformly branching in upper part; radical leaves with long petioles, broadly triangular, tripinnatisect into 8 mm long, 1.5 mm wide linear sections; cauline leaves sessile, dissected into straight, narrow, spreading to 20 mm long sections usually with scabrous margins. Umbels of 6–18 unequal, 2–5 cm long rays; involucre of 2–6 setiform herbaceous leaflets; umbellets 10–15-flowered, the 5–6 leaves of the involucre similar to those of the involucre; calyx without teeth; petals 1 mm long, broadly obovate, with short, acute inward curved tip; stylopodium conical, with constricted base; styles short, curved outward above; fruit oblong-ovoid, brown, 3–5 mm long; mericarps circular in cross section, slightly ribbed; resinous canals wide, solitary between ribs, 2 toward commissure. June–August.

Herbaceous steppe mountain slopes, valleys, to 2,200 m. — Centr. Asia: T. Sh., Dzu.-Tarb., Pam.-Al. (Alai Range). Gen. distr.: Afghanistan. Described from Arganat Mountains. Type in Leningrad.

Note. There are records from the northern parts of Afghanistan (Boiss. Fl. or. Suppl.) but these have not been confirmed.

Genus 972. **SMYRNIUM*** L.

L. Sp. pl. (1753) 262. — *Anosmia* Bernh. in Linnaea, VII (1832) 608

- Calyx-teeth inconspicuous; petals greenish-yellowish; fruit geminate, cordate at base, nearly black when ripe; stylopodium short-conical, style divergent, nearly $1\frac{1}{2}$ times as long as stylopodium; mericarps globose-ovoid, strongly tapering along commissure, with 5 protruding filiform primary ribs, along which there run cylindrical vascular-fibrous bundles, with strongly developed xylem; canals numerous; albumen broadly and
221 deeply notched toward commissure, with more or less rolled margins; stylopodium 2-partite. Glabrous biennial herbs, the radical and lower cauline leaves ternate-pinnate, the upper entire.

* From *smyrnion*, ancient Greek name for *Smyrniium perfoliatum* (or *S. olusatrum*), from *smyrna* — myrrh (gum resin), referring to the plant's pleasant aroma reminiscent of myrrh.



PLATE XVI. 1—*Danaa nudicaulis* (M.B.) Grossh.; 2—*Smyrniurn perfoliatum* L.

Seven species endemic to Europe, N. Africa, Asia Minor, Caucasus, Iran and Turkmenistan.

1. Umbels of 6–12 rays (Crimea and Caucasus) 1. *S. perfoliatum* L.
+ Umbels of 15–20 rays (Turkmenistan) 2. *S. cordifolium* Boiss.

1. *S. perfoliatum* L. Sp. pl. (1753) 262; Ldb. Fl. Ross. II, 364; Boiss. Fl. or. II, 925; Shmal'g., Fl. I, 428; Grossg., Fl. Kavk. III, 140. — *S. dioscordis* Spreng. Umbell. spec. (1818) 25. — *S. olusatrum* Ldb. Fl. Ross. II, 364, non L. — *Selinum dioscoridis* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 82. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 2036.

Biennial; entire plant glabrous; root thickened, ovoid or spherical; stem 50–125 cm high, with winged faces branching above; radical leaves petiolate, biternately dissected, with oblong-ovate, crenate-serrate leaflets 4–8 cm long, 2.5–4.5 cm wide; cauline leaves ovate, sessile, entire or 3-partite, dentate, with deeply cordate base. Umbels pedunculate or sessile, of 6–10 unequal glabrous rays; involucre and involucels none; petals greenish-yellow, broadly ovate, with inward curved tip, 1 mm long; fruit 2.5–3.5 mm long, nearly black, shiny, irregularly netted-rugose between ribs; styles long, reflexed in fruit. May–June. (Plate XVI, Figure 2.)

Shady mountain forests. — European part: Crim.; Caucasus: Cisc., Dag., W. and E. Transc. Gen. distr.: W. and E. Med., Bal.-As. Min., introduced into Centr. Eur. Described from Italy and Crete. Type in London.

2. *S. cordifolium* Boiss. Diagn. ser. I, 6 (1855) 64; Boiss. Fl. or. II, 926.

Biennial; root thickened, 1.5–2 cm thick; stem single, 40–80 cm high, erect, 1–1.2 cm thick below, cylindrical, hollow, smooth, oppositely branching above, radical leaves withering early, long petioled, triternate-dissected, the large, ovate-rounded leaflets obscurely dentate or nearly entire, petiolulate; lower cauline leaves simple or bipinnate, 20 cm long and nearly as wide, on 222 more or less long petioles, almost abruptly expanding to amplexicaul sheaths; leaflets 5–10 cm long, 4–7 cm wide, pectinate-dentate or nearly entire, cuneate or decurrent; upper leaves entire, opposite, ovate-cordate, acute. Umbels 2.5–7.5 cm across, of 15–20 slightly unequal glabrous rays; involucre and involucels absent; calyx-teeth inconspicuous; petals yellow, ovate, with inward curved tip; stylopodium flat, disciform, with undulant margins; styles divergent, 2 mm long; fruit geminate, 4–5 mm high, 8–10 mm wide; mericarps subglobose, with 3 acute ribs, rugose between ribs. July.

Stony ravines. — Centr. Asia: Mtn. Turkm. Gen. distr.: Iran. Described from Iran. Type in Geneva.

Genus 973. **SMYRNIOPSIS*** Boiss.

Boiss. in Ann. Sc. Nat. Botan. sér.3, II (1844) 72

Flowers heterogenous, bisexual, partly staminate; calyx-teeth obtuse; petals oblong, yellowish, with inward curved tip, nearly not notched; stylopodium flattened; fruit ovoid; mericarps with protruding ribs and valliculae, 2 lateral ribs broad and flat, forming border of fruit; 1-2 canals under valliculae; styles long, recurved. Annuals, with bipinnate leaves.

Four species, three in Asia Minor and one in Transcaucasia.

1. *S. armena* Schischk. in Referatakh rabot za 1945 g. Otdel. biolog. nauk (1947) 10. — *S. aucheri* Karjag. in Tr. Bot. Inst. Baku, II (1936) 265, non Boiss.

Annual; stem to 1 m high, subcylindrical or angular, ribbed, glabrous, with opposite or whorled branches; radical and lower cauline leaves nearly bipinnate, ovate, 35 cm long, 20 cm wide; lower primary lobes short-petioled, those of the second order sessile, ovate, 7-8 cm long, 3-5 mm wide, acute or obtuse, with short, acute, irregular teeth; petioles and lower side of nerves covered with thick scattered hairs; upper leaves smaller, not as dissected, often ternate. Umbels of 12-15 smooth rays; involucre of 5-6 irregular lanceolate or lanceolate-linear reflexed acute herbaceous leaflets; involucels of 1-3 linear small leaflets; flowers bisexual and staminate; calyx-teeth inconspicuous; petals yellowish; fruit ovoid, 6-7 mm long, ca. 3 mm wide, with prominent ribs and broad flat valliculae with 1-2 canals and slight surface swellings; stylopodium flattened; styles long, recurved. July.

Dry slopes, shrubby formations. — Caucasus: S. Transc. (Daralagez). Endemic. Described from near Kodukh-Vank village. Type in Leningrad.

Genus 974. **DANAA**** All.

All. Fl. Pedemont. II (1782) 34. — *Physospermum* Cuss. in Mém. Soc. Med. Par. (1782) 279. — *Haenselera* Lag. Gen. et sp. nov. (1816) 13, nec Boiss. — *Physophora* Link, Enum. Hort. Berol. I (1821) 278. — *Pseudospermum* S.F. Gray Nat. Arr. Brit. Pl. II (1821) 517. — *Alschingera* Vis. Fl. Dalm. III (1849) 69

Flowers bisexual; calyx-teeth inconspicuous; petals white, broadly ovate, notched with inward curved tip; fruit nearly geminate, cylindrical, cordate at base, strongly compressed along commissure; stylopodium conical; mericarps subcircular in cross section or obtusely pentagonal, with 5 filiform hardly protruding ribs carrying weak vascular-fibrous bundles; valliculae with 1 canal, 2 canals at commissure; styles recurved; albumen horseshoe-shaped in cross section; carpophore slit into 2 at apex. Perennial herbs with biternate-pinnate leaves and many-rayed umbels.

* From *Smyrnium*, another genus, and the Greek *opsis* — appearance.

** After Giovanni Pietro Maria Dana, late 18th century physician and professor at Turin, who studied the native plants of his country.

Six species from England through the Mediterranean area and N. Africa all the way to the Caucasus and Central Asia.

1. Stem 1-leaved; involucre and involucels present 1. *D. nudicaulis* (M. B.) Grossh.
- + Stem leafy; involucre and involucels absent 2. *D. denaensis* (B. Fedtsch.) Schischk.

1. *D. nudicaulis* (M. B.) Grossh. in Opred. rast. Kavk. (1949) 220. — *D. cornubiensis* Grossg., Fl. Kavk. III, 241, non Burnat. — *Pimpinella danaa* M. B. Beschreib. der Länder zwischen den Flüssen Terek und Kura am Kaspischen Meere (1800) 163, App. No. 36. — *Smyrnum nudicaule* M. B. Fl. taur.-cauc. I (1808) 238. — *Physospermum aquilegifolium* Ldb. Fl. Ross. II, 363, non Koch; Shmal'g., Fl. I, 428; Boiss. Fl. or. II, 923. — *Ph. nudicaule* C. A. M. Verzeichn. Pfl. Cauc. (1831) 132. — Ic.: Spreng. Spec. Umbell. (1818) tab. 4. — Exs.: G. R. F. No. 2632; Callier, It. taur. a. 1900, No. 620.

- 224 Perennial; root rather thick, 0.5–1 cm thick; root neck sparsely covered with remnants of petioles; stem 50–120 cm high, erect, glabrous, thinly ribbed, branching above or from middle, leafless or (rarely) with a single developed leaf on lower part of stem; radical leaves long-petioled, their blade broadly triangular, 12–17 cm long, 17–20 cm wide, biternate-pinnate; primary lobes on rather long petiolules, the secondary sessile or (the proximal ones) on petiolules, broadly ovate, pinnatifid; cauline leaves (if present) similar to the radical but smaller, remaining cauline leaves oblong, amplexicaul sheaths usually purple. Umbels 5–8 cm across, of 10–20 smooth rays, the lateral umbels smaller, 1.5–4.5 cm across; involucre of 5–7 lanceolate acuminate, usually reflexed leaflets; umbellets 1–1.5 cm across, 10–16-flowered; involucels of 5–7 lanceolate or lanceolate-linear straight acuminate leaflets; petals white, 1.5–1.8 mm long, broadly ovate, notched, with inward curved tip; fruit cylindrical, nearly geminate, 4 mm long, 5 mm wide; stylopodium conical; styles recurved, 3 times as long as stylopodium. Fl. June–July, Fr. August (Plate XVI, Figure 1.)

Pine, oak, beech, oak-hornbeam forests, shrubby formations, limestone mountain meadow slopes. — European part: V.-Don, Bl., Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: Bal.-As. Min. Described from the Crimea and Caucasus. Type in Leningrad.

2. *D. denaensis* (B. Fedtsch.) Schischk. sp. nov. in Addenda XV, 593. — *Physospermum denaense* B. Fedtsch. on label in Gerb. Bot. inst. im. V. L. Komarova AN SSSR.

Perennial; stem ca. 1 m high, cylindrical, with narrow longitudinal striae, not hollow, like leaves glabrous, branching; on petioles of cauline leaves abruptly expanding to amplexicaul sheath, nearly as long as blade, the blade triangular-ovate, 20–30 cm long, 10–20 cm wide, nearly tri-pinnatisect; primary lobes long-petioluled, the secondary short-petioluled, lobes of the last order sessile, more or less decurrent on petiolules, broadly ovate, 3–7 cm long, 2.5–4 cm wide, irregularly lobuled, lobules with few rounded apical teeth. Umbels subglabrous, of 10–12 rays, 9–12 cm long, broadly spreading in fruit; involucre and involucels absent; umbellets of

8-10 thin, glabrous rays 1.5-4 cm long in fruit; flowers unknown; fruit geminate, 3 mm long, 5 mm wide; stylopodium short-conical; styles recurved, twice as long as stylopodium; mericarps subglobose, with obscure 225 filiform ribs and dark-colored translucent canals; carpophore entire or split into 2 at apex. Fr. at beginning of June (Plate XV, Figure 8.)

Ravines. - Centr. Asia: Pam.-Al. Endemic. Described from the Sangardak Gorge at the southwestern spurs of Gissar Range. Type in Leningrad.

Note. This species was collected only once, when in fruit (on 5 June). It obviously blossoms much earlier. We should like to draw the attention of future investigators to this extremely interesting species, the root system, radical leaves and flowers of which are unknown.

Genus 975. **CONIUM*** L.

L. Sp. pl. (1753) 243

Calyx-teeth inconspicuous; petals white, obcordate, with short inward curved lobe; fruit broadly ovoid, slightly compressed laterally; stylopodium short-conical; styles recurved, nearly twice as long as stylopodium; mericarps with 5 cartilaginous, flexuose ribs; pericarp thick; in ripe fruit canals obliterated, carpophore not split; albumen deeply and narrowly incised toward commissure. Biennial herbs with high stem and tripinnate leaves with reddish spots.

Four species in Europe, Siberia and Asia Minor.

1. *C. maculatum* L. Sp. pl. (1753) 243; Ldb. Fl. Ross. II, 360; Boiss. Fl. or. II, 922; Shmal'g., Fl. I, 426; Kryl., Fl. Zap. Sib. VIII, 2042; Grossg., Fl. Kavk. III, 141. - *C. cicuta* Neck. Delil. Gallo-Belg. I (1768) 142. - *C. maculosum* Pall. Reise, I (1771) 478, nom. nud. - *C. croaticum* Waldst. et Kit. ex Willd. Enum. Horti Berol. (1809) 305. - *Coriandrum cicuta* Crantz, Stirp. Austr. Ed. 1, III (1767) 100. - *C. maculatum* Roth, Tent. Fl. Germ. I (1788) 130. - *Cicuta officinalis* Crantz, Cl. Umbell. Emend. (1767) 68. - *C. maculata* Lam. Fl. Franc. III (1778) 104, non L. - *C. major* Lam. Fl. Franc. III (1778) 456. - *Sium conium* Vest. Man. bot. (1806) 513. - *Selinum conium* E. H. L. Krause in Sturm. Fl. Deutschl. ed. 2, XII (1904) 122. - Ic.: Komarov, Sbor. sushka i razved. lekarstv. rast. Izd. 3, tabl. 58 (1917); Maevskii, Fl. Sredn. Ross. p. 255 (1918). - Exs.: G. R. F. No. 878; H. F. A. M. No. 236.

226 Biennial; stem 60-180 cm high, branching, finely sulcate, like leaves glabrous, sometimes with glaucous bloom and reddish-brown spots in lower part; lower leaves petiolate, tripinnate, broadly triangular, 30-60 cm long, with primary, secondary and tertiary lobes petiolate, only the lowermost sessile, the tertiary ones oblong-ovate, deeply pinnatisect into ovate-lanceolate, acuminate lobules, sometimes with short whitish tip; median and upper leaves smaller and not as compound, subsessile, with narrow sheath. Umbels numerous, forming corymbiform-paniculate inflorescence, of 12-20 rays, slightly scabrous inside; involucre of ovate-lanceolate, narrow-margined obscurely crenate reflexed leaflets; leaflets of

* From the Greek *conis* - sucker, referring to the dizziness induced by eating of the fruit.



PLATE XVII. 1—*Albovia tripartita* (Kalen) Schischk.; 2—*Bifora radians* M.B.; 3—*B. testiculata* (L) DC.; 4—*Fuernrohria setifolia* C. Koch.

involucels 3-7, second, connate at base, ovate-lanceolate, glabrous, with narrow scarious margin, shorter or slightly longer than rays; fruit subcylindrical or ovoid, 3-3.5 mm long; styles ca. 1 mm long, becoming curved, nearly twice as long as stylopodium. June-July.

Forest edges, flooded meadows, limestone slopes, weeds in crops and fallow land, near dwellings, kitchen gardens, roadsides, hedges, dumps, walls of ravines and railroad tracks. — European part: all regions; Caucasus: Cisc., Dag., E., W. and S. Transc.; W. Siberia: Ob, U. Tob., Irt.; Centr. Asia: Balkh., Dzu.-Tarb., T. Sh., Syr D., Amu D., Pam.-Al., Mtn. Turkm. Gen. distr.: Scand., Centr. and Atl. Eur., N. Afr., Bal.-As. Min., Arm.-Kurd., Iran., Sinkiang, introduced into Canada, U. S. A. and Mexico. Described from Europe. Type in London.

Economic importance. All parts of the plant, especially the fruits, contain toxic alkaloids, which decompose upon drying. The alkaloid content depends upon the stage of development, gradually reaching a peak at blossoming and fruit-bearing (0.725-1.3%), highest in young fruits, lowest in roots. Coniine is the main alkaloid (C₈H₁₇N) (fresh dried fruits contain 0.2-0.8%, leaves 0.01-0.04%). This is readily soluble in alcohol, ether and fatty oils, only slightly so in water. The following alkaloids have also been found: methylconiine (C₉H₁₉N), conidrin (C₈H₁₇NO), pseudoconidrin (C₈H₁₇NO) and coniceine (C₈H₁₅NO). In former times, preparations from poison-hemlock were widely used to treat a variety of diseases. In view of its minor effect and the occurrence of poisoning doctors stopped prescribing these preparations. In ancient Greece potions of poison-hemlock were administered to persons condemned to death, among them Socrates and Phocion.

In warm weather or when dried the plant has a disagreeable odor reminiscent of mice and a sharp, bitter taste.

Genus 976. **PLEUROSPERMUM*** Hoffm.
Hoffm. Gen. Umbell. ed. 1 (1814) p.VIII

Calyx-teeth obsolete or very small; petals white, short-clawed, broadly ovate, obtuse or acuminate, straight or slightly curved inwards; stylopodium inflated, with flat crenate margin; fruit ovoid-oblong, slightly compressed laterally; mericarps with 5 equal, protruding, slightly winged main ribs; canals solitary under valleculae, 2-4 at commissure; carpophore free, split into 2; albumen crescent-shaped in cross section, slightly angular dorsally with broad shallow notch toward commissure. Biennial (or perennial) tall herbs, with large bipinnate leaves.

Only 3 species growing in Eurasia are included.

1. Terminal leaf lobes long-acuminate, leaves pubescent along margins and on lower side of nerves, leaflets of involucre always dissected, rays of umbels angular, strongly scabrous, ribs of fruit with dentate wings 2.

* From the Greek pleura — rib, sperma — seed, referring to the strongly developed ribs of the fruit.

- + Terminal leaf lobes abruptly short-acuminate, margin of leaves and lower side of nerves with short scattered hairs, leaflets of involucre entire or only shallowly cut, rays obscurely angular, fruit with obscurely dentate wings 1. *P. austriacum* (L.) Hoffm.
- 230 2. Plant to 120 cm high, main umbel of 20–40 rays, fruit ca. 6 mm long, 4 mm wide 2. *P. uralense* Hoffm.
- + Plant to 200 cm high, with up to 60 rays in main umbel; fruit 6–9 mm long, 4–6 mm wide 3. *P. camtschaticum* Hoffm.

1. *P. austriacum* (L.) Hoffm. Gen. Umbell. ed. I (1814) p. X; Ldb. Fl. Ross. II, 360; Shmal'g., Fl. I, 426, ex parte; Horn. af Rantzien in Candollea, XI (1947–1948) 13, ex parte. — *P. lithuanicum* Downar in Bull. Soc. Nat. Mosc. XXXIV, 1 (1861) 180. — *P. boreale* Gand. Nov. Cons. Fl. Eur. (1910) 223. — *P. austriacum* subsp. *eu-austriacum* Horn. af Rantzien in Svensk Bot. Tidskr. 40 (1946) 182. — *Ligusticum austriacum* L. Sp. pl. (1753) 250. — *L. gmelini* Vill. Prosp. (1779) 24. — *L. brancionis* Schrank, Baier. Fl. I (1789) 551. — *Thysselinum grandiflorum* Moench, Meth. (1794) 85. — *Selinum pleurospermum* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 78. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 2033 (1867).

Biennial or perennial; stem single, 60–150 cm high, erect, hollow, sulcate, branching above, covered with short stiff hairs under inflorescence; leaves have short-scabrous margins; the lower triangular-ovate, biternate or nearly tripinnatisect, long-petioled, the outer second-order lobes much larger and more deeply cut than the inner; lobes of the third order ovate or oblong, pinnatifid, proximally fused; lobules unequally toothed or cut, short-acuminate, with broadly or narrowly ovate, slightly antrorse, acute or obtuse teeth, with short cartilaginous mucro; upper cauline leaves smaller, not so deeply cut, sessile on short, slightly convex sheath, the margin with scarious curly hairs. Terminal umbel ca. 20 cm across, of 12–20(40) short-haired rays; leaflets of involucre numerous, herbaceous, sometimes cut, becoming reflexed, umbel rays hairy, involucels many-leaved, leaflets lanceolate, entire, with slightly scarious margins, with 3 longitudinal nerves; calyx-teeth triangular, obtuse; petals white, rounded, 2.5–3 mm long, with papillate upper surface; fruit ca. 10 mm long, 6 mm wide, obtuse, with thin crenulate ribs; styles filiform, stigma capitate, $1\frac{1}{2}$ –2 times as long as stylopodium, becoming recurved. July.

Forests and shrubby formations. — European part: Balt., U. Dnp., M. Dnp., U. Dns. Gen. distr.: Centr. Eur., Scand. (eastern part of Sweden), Bal. Described from Austria. Type in London.

- 231 Note. According to reports from Sweden (H. H. af Rantzien, 40, 2 (1946) 179–213), a single specimen produces up to 6,600 seeds, but germination is very low. The seeds may float for 3–10 days and seem to be adapted to dispersal by water.

2. *P. uralense* Hoffm. Gen. Umb. ed. 1 (1814) p. IX; Ldb. Fl. Ross. II, 361; Kryl., Fl. Zap. Sib. VIII, 2059. — *P. austriacum* Ldb. Fl. alt. I, 368, non Hoffm.; Fl. Ross. II, 360, ex p.; Turcz. Fl. baic.-dah. I, 512. — *P. archangelica* Ldb. Fl. alt. I (1829) 369; Ldb. Fl. Ross. II, 361; Bong. Veg. Ins. Sitcha (1832) 141. — *P. gmelini* Steud. Nom. ed. 2, II (1840) 335. — *P. austriacum* ssp. *uralense* Somm. et Lev. Fl.

dell'Ob inter. (1896) 73. — *Laserpitium athamantae* Spreng. in Schult. Syst. veg. VI (1820) 624; DC. Prodr. IV, 206; Ldb. Fl. Ross. II, 336. — Ic.: Hoffm. l. c. tab. 1-B, f. 24; tab. 2, f. 6, 7, 23; Fedch. and Fler., Fl. Evrop. Ross. (1910) 682.

Biennial, or perennial; stem single, 70–120 cm high, thinly sulcate, 1–2 cm thick, glabrous, with short stiff hairs only below inflorescence; leaves with short stiff hairs along margins and nerves, very rarely subglabrous; lower leaves ternate, long-petioled, broadly triangular, 10–25 cm long and as wide; primary leaflets petioluled, pinnatipartite into ovate-lanceolate, acuminate, sessile, proximally fused lobes, 4–12 cm long, 1–5 cm wide, irregularly large-toothed or pinnatifid; upper leaves smaller, not as dissected, sessile on amplexicaul sheaths. Terminal umbel large, 10–20 cm across, usually surrounded by several smaller umbels, 4–7 cm across, terminating branches produced at base of terminal umbel, of (15)20–40 rays covered with short stiff hairs; involucre of many large, 1.5–6 cm long reflexed leaflets expanding in upper part, these often cut, usually into 3 teeth; umbellets on main umbel large, 2–3 cm across, those on lateral umbels smaller; involucels of lanceolate or sublinear acute reflexed leaflets, as long as or longer than pedicels; calyx-teeth ovate, obtuse, membranous; petals white, ovate, slightly acuminate, with almost flat tip, 2–3.5 mm long; fruit ca. 6 mm long, 4 mm wide, with thin, acute, short-crenate ribs; stylopodium short-conical, slightly expanded at base; styles recurved, twice as long as stylopodium. June–July.

232 Coniferous forests, forest edges, pine forests, birch-aspen forests, felled forests, rarely in subalpine meadows, ravines and near swamps. — European part: Dv.-Pech., V.-Kama, Transv.; W. Siberia: all regions; E. Siberia: all regions. Gen. distr.: Mong., Jap.-Ch. Described from the Urals. Type in Leningrad (?).

Note. *Laserpitium athamantae* Spreng. is given here as a synonym although we have not seen the type specimens from Siberia. However, Sprengel's short description is good enough, and does not suit any of the Siberian species of Umbelliferae with the exception of *Pleurospermum uralense*. *P. archangelica* Ldb. surely is another synonym. It has been described from fruits which certainly belong to *Pleurospermum uralense*, collected by Ledebour in the vicinity of Riddersk and kept in the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR.

3. *P. camtschaticum* Hoffm. Gen. Umb. ed. 1 (1814) p. X.; DC. Prodr. IV, 224; Ldb. Fl. Ross. II, 361; Kom., Fl. Kamch. II, 336. — *P. uralense* Hult. Fl. of Kamtch. III, 584, non Hoffm. — Ic.: Sugaw. Ill. Fl. Saghal. III, tab. 635 (1940).

Perennial; root thick, 2–3 cm across; stem single, 70–200 cm high, sulcate, 1–3 cm thick, glabrous, or short-scabrous only below inflorescence; leaves long-petioled, triangular, 15–30 cm long, 12–25 cm wide, bi- or nearly tripinnatisect; lower primary lobes petioluled, the secondary sessile or decurrent on petiolules, 6–10 cm long, 1.5–5 cm wide, deeply and unequally acutely toothed or pinnatifid, the margins and lower side of nerves covered with stiff hairs, their upper side scabrous; upper leaves smaller, less dissected, sessile on amplexicaul sheaths. Main umbel large, 10–20 cm

across, of 20–60 rays covered with short stiff hairs; lateral umbels smaller, of 10–15 rays, 4–7 cm across, terminating alternate or whorled branches produced below main peduncle and exceeding level of central umbel; involucre of many linear or lanceolate, often pinnatifid 2–8 cm long leaflets; umbellets of main umbel many-flowered, 2–3 cm across; lateral umbels smaller; leaflets of involucels numerous, as long as umbel rays or shorter or slightly longer than umbellet, linear-lanceolate, acute or acuminate, becoming reflexed after flowering; calyx-teeth ovate, membranous; petals white or slightly pink, broadly ovate, entire, acute or obtuse, often with inward curved tip, ca. 2–2.5 mm long, abruptly tapering to short claw; fruit 6–9 mm long, 4–6 mm wide, ribs crenulose with acute margins; stylopodium short-conical, its undulant base with expanding margins. July–August.

233 Forest glades, mixed and coniferous forests, riparian meadows. — Far East: Kamch., Okh., Uda, Uss., Sakh. Gen. distr.: Jap.—Ch.? Described from Kamchatka. Type was in Moscow.

Genus 977. **HYMENOLAENA** * DC.

DC. Prodr. IV (1830) 244.—Renarda Rgl. in Tr. Bot. Sada, VIII (1883) 278.—Pleurospermum subgenus Hymenolaena Drude in E.—P. Pflanzenfam. III, 8 (1898) 171

Calyx 5-toothed; petals broadly elliptic, broad-clawed, white or pink, with inward curved tip; fruit cylindrical-oblong, slightly compressed laterally; stylopodium short-conical; style longer than stylopodium; mericarps with 3 winged dorsal ribs and slightly developed lateral ribs; 3 canals under valliculae; albumen reniform in cross section. Perennial herbs with simple or bipinnate leaves and large, ovate involucel leaflets.

About 10 species in Tibet, the Himalayas, and the mountains of Central Asia.

1. Involucre 0, involucels of 5 large broadly ovate leaflets 10–12 mm long, 8–10 mm wide; leaves pinnate 1. *H. pimpinellifolia* Rupr.
- + Involucre of 3, involucels of 5–12 ovate leaflets 4–6 mm long, 3–4 mm wide; leaves bipinnate 2.
2. Stem reduced, 3–10 cm high, often obsolete; involucels of 8–12 leaflets; umbels of 3–5 rays; leaves bipinnate 2. *H. nana* Rupr.
- + Stem 15–30 cm high; involucels of 5 leaflets; umbels of 7–12 rays; leaves nearly tripinnate 3. *H. alpina* Schischk.

Series 1. *Pimpinellifoliae* Schisch.—Leaves simple-pinnate, involucre 0.

1. *H. pimpinellifolia* Rupr. Sert. tiansch. (1869) 49.—*H. lindleyana* var. *soongorice* Lipsky et var. *bucharica* Lipsky in Tr. Bot. Sada, XXVIII, 1 (1900) 71.—*Renarda siifolia* Rgl. in Trautv., Rgl., Maxim. et Winkl. Decas pl. nov. (1882) 5 et in Tr. Bot. Sada, VIII (1883) 278.—*Pleurospermum stellatum* β *lindleyanum* Clarke in Hook. Fl.

* From the Greek *hymen* — membrane, and *laena* (or *chlaena*) — outer clothing.

Britt. Ind. II (1879) 705, ex p. — Ic.: Trautv., Rgl., Maxim. et Winkl. Decas pl. nov. (1882) tab.

234 Perennial; root thick, 5–10 mm across, multicapital or simple; stems few or solitary, 10–40 cm high, erect or slightly curved, glabrous, 4–5.5 mm thick, slightly sulcate, violet sometimes only in lower half, slightly branching above, bearing 1–4 leaves; radical leaves often many, their petioles abruptly expanding to violet-colored sheath longer or shorter than blade; blade oblong, 3–12 cm long, 1–3 cm wide, pinnate, with broadly ovate, cuneately tapering lobes, their margins cut into unequal broadly ovate or ovate-oblong, obtuse teeth; cauline leaves similar to the radical, the upper smaller, sometimes reduced to sheaths. Umbels of 1–4 nearly equal, strongly furrowed rays slightly scabrous above; involucre 0 or of 1 leaflet; umbellets many-rayed; leaflets of involucels broadly ovate, longer than pedicels, nearly entirely white-scarious, tapering abruptly at base, obtuse or rounded or slightly notched. July. (Plate XV, Figure 10, Plate XVIII, Figure 1.)

Rocks, rock streams, old moraines, dry meadows in alpine belt, 4,000 m. — Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from Dzhungol in Tien Shan. Type in Leningrad.

Economic importance. Because of its large white involucel leaflets similar to those of *Astrantia*, this plant is recommended as an ornamental.

Series 2. *Nanae* Schischk. — Leaves bi- or nearly tripinnate; involucre of 3–5(7) leaflets.

2. *H. nana* Rupr. Sert. tianschan. (1869) 49. — *H. lindleyana* Lipsky in Tr. Bot. Sada, XVIII, 1 (1900) 68, non Klotzsch. — *Pleurospermum nanum* Benth. et Hook. ex Drude in Engl. u. Prantl., Pflanzenf. III, 8 (1898) 172. — *P. lindleyanum* B. Fedtsch. Rastit. Turkest. (1915) 604.

235 Perennial; root rather thick, 3–4 mm across, ascending; stems usually inconspicuous, rarely 1–15 cm high, usually simple, not branching, sulcate, violet in lower half, 1–3-leaved or leafless; radical leaves on petioles as long as blade or shorter, expanding to sheath; blade nearly bipinnatisect, ovate-oblong, 1–6 cm long, 0.8–2 cm wide; lower primary lobes on 2–8 mm petiolules or all lobes sessile, deeply pinnatisect or pinnatipartite into linear-oblong or ovate obtuse lobules. When stem obsolete, umbels usually of 4–6 unequal, glabrous, furrowed, 5–20 mm long rays, with involucre of 2–4 leaflets, $\frac{1}{2}$ – $\frac{1}{3}$ the length of the rays, similar to the reduced cauline leaves, with long membranous violet sheath and green blade pinnatisect at apex; umbellets many, with involucels of 8–12 ovate or lanceolate-ovate, mucronate, nearly entire (except for midrib), scarious leaflets. July. (Plate XVIII, Figure 2.)

Alpine zone among rocky slopes, gravelly banks of mountain streams, moraines near glaciers, taluses. — Centr. Asia: T. Sh., Pam.-Al. (Pamir). Gen. distr.: Dzu.-Kash. (Sinkiang). Described from Tashrabat. Type in Leningrad.

Note. Lipskii (ibid.) identified this plant with *Hymenolaena lindleyana* Klotzsch. of the Himalayas, but the Pamir-Tien Shan plant

differs from the latter by the obtuse lobes of the last order and the entire (not trisect) leaflets of the involucre. *Lipskii* also included in it *H. pim-pinellifolia* Rupr., a separate species.

3. *H. alpina* Schischk. sp. nov. in Mat. Gerb. Bot. Inst. AN SSSR, XIII (1950) 158.

Perennial; root to 1 cm thick; stem long, 15–30 cm high, sometimes branching from base, cylindrical, thinly ribbed, glabrous; radical leaves more or less numerous, triangular, their petioles as long as blade, abruptly expanding to amplexicaul sheath; blade bi- or nearly tripinnatisect, 2–8 cm long, 1.5–6 cm wide; lower primary lobes more or less long-petioluled, cut into entire or pinnatifid ovate obtuse lobules 4–6 mm long, 1.5–3 mm wide; upper leaves smaller, sessile on expanded sheath, not as deeply cut. Umbels 2–5 cm across, the 7–12 slightly irregular rays scabrous in upper part; involucre of 5(7) broadly ovate, white-scarious, short-acuminate, spreading leaflets $\frac{1}{4}$ to $\frac{1}{2}$ the length of the rays; umbellets many-flowered, ca. 1 cm across; leaflets of involucels white-scarious, ovate, short-acuminate, 4–6 mm long, 3–4 mm wide, as long as umbellets; petals white or slightly pink, ca. 1 mm long; young fruit with winged dorsal ribs; stylopodium short-conical; styles recurved, $1\frac{1}{2}$ times as long as stylopodium; ripe fruit not known. July. (Plate XVIII, Figure 3.)

Stony taluses in alpine belt, 3,000–3,300 m. — Centr. Asia: Pam.-Al. Endemic. Described from atop Sangisauz Range. Type in Leningrad.

236 Genus 978. **ELEUTHEROSPERMUM** * C. Koch.

C. Koch in *Linnaea*, XVI (1842) 365. — *Pleurospermum* subg. *Eleutherospermum* Drude in *E.-P. Pflanzenfam.* III, 8 (1898) 172

Calyx-teeth short, obtuse; petals greenish, yellowish-whitish or pink-purple, broadly ovate, notched, with inward curved tip; fruit broadly ovoid, laterally compressed; mericarps with 5 acute ribs; valliculae with canals, 4 canals toward commissure; albumen crescent-shaped in cross section with incurved margins. Perennial herbs, with bi- or tripinnatisect leaves and subulate or linear leaflets of involucre and involucel.

Two species in the Caucasus and Asia Minor.

1. Rays of umbels and umbellets glabrous; petals greenish- or yellowish-whitish 1. *E. cicutarium* (M. B.) Boiss.
- + Rays of umbel and umbellets scabrous above; petals purple or pink-reddish 2. *E. lazicum* Boiss.

1. *E. cicutarium* (M. B.) Boiss. Fl. or. II (1872) 924; Shmal'g., Fl. I, 427. — *E. grandifolium* C. Koch in *Linnaea*, XVII (1843) 31; Ldb. Fl. Ross. II, 364 (*sphalm. grandiflorum*); Bordzilovskii in Vestn. Kievsk. Bot. Sada, XII–XIII (1936) 102, descr. emend. — *E. chrysanthum* Somm. et Lev. in *Nuovo Giorn. bot. Ital.* II, 2 (1895) 74; in *Bull. Soc. Bot. Ital.*

* From the Greek *eleutheros* — free, *sperma* — seed.

(1895) 43 and in Tr. Bot. Sada, XVI (1900) 183. — *Smyrnum cicutarium* M. B. Fl. taur.-cauc. I (1808) 239. — *Physospermum cicutarium* Spreng. Umbellif. Spec. (1813) 23; DC. Prodr. IV, 247; Ldb. Fl. Ross. II, 363. — *Ph. actaeifolium* Eichw. Casp.-Cauc. (1831–1833) 32, non Presl. — *Ligusticum caucasicum* Willd. ex Schult. Syst. VI (1820) 457. — *Hladnikia cicutaria* Boiss. in Ann. sc. nat. sér. III, II (1844) 71. — *Pleurospermum cicutarium* Drude in Engl. u. Prantl, Natürl. Pflanzenfam. III, 8 (1898) 172. — *P. grandiflorum* Drude (sphalm. pro *grandifolio*) l. c. (1898).

Perennial; stem 40–100 cm high, cylindrical, slightly sulcate, simple or branching, 3–6 mm thick at base; lower cauline leaves sessile on expanded sheath, ovate-triangular, 8 cm long, 10–12 cm wide, ternate; primary lobes ovate or triangular, acuminate, bi- or nearly tripinnatisect; lateral lobes sessile, terminal lobe decurrent, pinnatipartite or bipinnatipartite or pinnatisect, the lobes of the last order linear-lanceolate, acute, entire or
237 acutely toothed, with obscurely scabrous margin, lighter beneath, uppermost leaves reduced, sessile on sheath. Umbels of 6–12 unequal, furrowed, glabrous, ca. 6 cm long rays; leaflets of involucre 3–7, linear, glabrous, entire or 2–3-lobed, becoming reflexed; involucels of 3–5 linear or linear-lanceolate herbaceous leaflets half the length of the pedicels; calyx with 5 short obtuse teeth; petals greenish-yellowish or white, tapering to long inward curved tip; fruit broadly ovoid, laterally compressed, 5–6.5 mm long, 4–4.5 mm wide; mericarps with 5 acute ribs; vallecule with 3 canals, commissure with 4; albumen with incurved margins; stylopodium subconical; styles much shorter than stylopodium. July–August. (Plate XV, Figure 11, Plate XVIIIa, Figure 1.)

Subalpine meadows, edges of mountain forests. — Caucasus: Cisc., W., E. and S. Transc. Gen. distr.: N. Iran. Described from Alazan River valley. Type in Leningrad.

2. *E. lazicum* Boiss. et Bal. in Boiss. Fl. or. II (1872) 924. — *E. rubellum* E. Busch in Tr. Bot. muz. AN SSSR, XXIII (1931) 229. — *Pleurospermum lacicum* Drude (erron.) in Engl. u. Prantl, Natürl. Pflanzenfam. III, 8 (1898) 172. — Ic.: E. Busch, *ibid.*, Fig. 1.

Perennial; plant entirely glabrous, except for inflorescence; rhizome long, creeping; stem 40–80 cm high, cylindrical, faintly ribbed, simple or branching above; blades of radical and lower cauline leaves triangular, 10 cm long and just as wide, dark green above, light green beneath, bipinnatisect, their petioles longer than the blades; secondary lobes ovate, acute, 4.5–7 cm long, 2–4 cm wide, unequally pinnatifid or deeply dentate; upper leaves smaller, sessile on expanded sheaths. Umbels 3–8 cm across, rays 6–10, unequal, scabrous above; leaflets of involucre 1–3, unequal, subulate, only a fraction of the rays in length or absent; umbellets ca. 1 cm across, with short-scabrous rays; leaflets of involucels unequal, subulate, 3–4, calyx-teeth short, obtuse; petals violet or dark or light red. July–August.

Mountain beech forests. — Caucasus: W., E. and S. Transc. (W.). Gen. distr.: As. Min. (Pontus Range). Described from Pontus Range. Type in Geneva.

Note. *E. rubellum* E. Busch was included in the synonymy of *E. lazicum* Boiss. for the following reasons: *E. lazicum* differs from *E. cicutarium* by the same characters as *E. rubellum*, i. e., smaller leaves, scabrous rays of umbels and umbellets. According to E. A. Busch 238 *E. rubellum* is distinguished from *E. lazicum* by the color of the petals, yet Boissier's description includes no reference to the color of the petals. Voronov's specimens from Artvin district have dark violet petals, in all other respects they agree with *E. rubellum*. The latter locality links the distribution area of *E. lazicum* with the Caucasus.

Genus 979. **AULACOSPERMUM*** Ldb.

Ldb. Fl. alt. IV (1833) 334.—*Ligusticum* Sect. IV *Aulacospermum* Calest. in Webbia, I (1905) 211

Calyx with 5 conspicuous teeth; petals white, very rarely slightly yellowish, broadly ovate, tapering to short claw, with tapering inward curved tip; fruit broadly ovoid, slightly compressed laterally; stylopodium flat-pulvinate, often bluish; styles recurved, usually shorter than stylopodium; mericarps with equal thin winged ribs; vallecule with 1 canal, rarely with few, usually 4 canals at commissure; endosperm with deep furrow; seeds adnate to mesocarp. Perennial herbs, with tripinnatisect leaves.

Four to five species in the E. European part of the USSR, the mountains of Central Asia, and eastern region of S. Siberia, to Sayans.

- | | | |
|-----|---|--|
| 1. | Umbel rays 5–12 | 2. |
| + | Umbel rays 12–40 | 4. |
| 2. | Petals faint yellow; leaflets of involucels usually $\frac{1}{3}$ to $\frac{1}{2}$ the length of the pedicels; central flowers of umbel often sterile (Kirghiz Ala-Tau) | 6. <i>A. tianschanicum</i> (Korov.) C. Norman. |
| + | Petals white or pink; at least some of the leaflets of involucels nearly as long as umbel | 3. |
| 3. | Primary lobes of leaves cut into cuneate-dentate, 1–1.5 cm wide lobules | 5. <i>A. turkestanicum</i> (Franch.) Schischk. |
| + | Primary lobes of leaves cut to midrib into lanceolate or lanceolate-linear, 0.3–0.5 cm wide, densely pinnate lobules | 4. <i>A. simplex</i> Rupr. |
| 241 | 4. Fruit smooth in vallecule, wings likewise smooth, entire, occasionally undulant | 1. <i>A. anomalum</i> Ldb. |
| + | Fruit with small verrucae in vallecule, sometimes also on wings, wings with wavy margins, often unequally dentate | 5. |
| 5. | Stems 10–50 cm high, usually many; fruit 5–5.5 mm long | 3. <i>A. darvasicum</i> (Lipsky) Schischk. |
| + | Stems 50–100 cm high, usually single; fruit 5.5–7 mm long (European part) | 2. <i>A. isetense</i> (Spreng.) Schischk. |

Subgenus 1. *Euaulacospermum* Schischk.—Petals white, pink or whitish-green; leaflets of involucels as long as or slightly shorter than umbel rays.

* From the Greek *aulax* (genitive *aulacos*) — furrow, *sperma* — seed.



PLATE XVIII. 1 — *Hymenolaena pimpinellifolia* Rupr.; 2 — *H. nana* Rupr.; 3 — *H. alpina* Schischk.

Series 1. *Anomala* Schischk.— Umbel rays numerous, 12–40.

1. *A. anomalum* Ldb. Fl. alt. IV (1833) 335; Fl. Ross. II, 362, ex p.; Kryl., Fl. Zap. Sib. VIII, 2058.— *Cnidium anomalum* Ldb. Fl. alt. I (1829) 330.— *Pleurospermum anomalum* B. Fedtsch. Rast. Turkest. (1915) 604.— *P. isetense* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1916) 177, non *Peucedanum isetense* Spreng. (1818).— *A. gonocaulum* M. Pop. in Byull. Mosk. Obshch. isp. prir. XLIV (1935) 129.— *A. rupestre* M. Pop., ibid. (1935) 130, ex p.

Perennial; root rather thick, 5–10 mm across, its neck covered with dark brown remnants of sheaths, stem 10–70 cm high, sulcate, branching above, sometimes obsolete, like leaves glabrous; radical and lower cauline leaves on long sheathing petioles, longer than blade, blade generally oblong-ovate or broadly ovate, 2.5–15 cm long, 1–8 cm wide, bi- or tripinnatisect, green above, paler beneath; primary lobes sessile or short-petioled, those of the last order linear-lanceolate or lanceolate, acute, 3–5 mm long, 0.6–1.5 mm wide; upper leaves small, sessile on expanded amplexicaul petioles with membranous margins. Umbels of 11–26, unequal, furrowed scabrous or smooth rays; median umbel 8–15 cm across, the lateral much smaller; involucre of 6–10 pinnatisect, 2–3-fid or entire leaflets with more or less developed scarious margins, half the length of the rays or shorter; umbellets 6–10 mm across, with unequal, slightly scabrous pedicels; leaflets of 242 involuclers numerous, linear or linear-lanceolate, acute or entire, usually shorter than pedicels, with 1–2 large distal teeth; calyx-teeth conspicuous, triangular; petals white, broadly ovate, drawn out into inward curved tip, tapering to narrow claw; fruit broadly ovoid, 4–6 mm long, 3.5–4 mm wide; stylopodium flat, entire; styles hardly exceeding or nearly equal to radius of stylopodium. June–July. (Plate XV, Figure 15.)

Herbaceous and stony mountain slopes in the alpine belt, on cliffs, sometimes in meadows.— W. Siberia: Alt., Ang.-Say.; Centr. Asia: Dzu-Tarb., T. Sh. Gen. distr.: Dzu.-Kash., Mong. (?). Described from Altai (Charysh, Koksu, Aleksandrovsk). Type in Leningrad.

2. *A. isetense* (Spreng.) Schischk. comb. nov.— *A. multifidum* Meinsh. in Linnaea, XXX (1859–1860) 515; Yu. Voron. in Fl. Yugo-Vost. V, 775; Kryl., Fl. Zap. Sib. VIII, 2058.— *A. tenuilobum* Meinsh. l. c. 515.— *A. anomalum* Ldb. Fl. Ross. II, 362, ex p.— *Peucedanum sibiricum* Spreng. Hist. r. herb. II (1808) 268, non Willd. (1797), nec Kit. (1802).— *P. isetense* Spreng. Gesch. d. Bot. II (1818) 200; DC. Prodr. IV, 181.— *Ligusticum multifidum* Smith in Rees Cyclop. XXI (1819) No. 8; DC. Prodr. IV, 159.— *L. tenuilobum* Calest. in Webbia (1905) 211.— *Pleurospermum multifidum* Benth. et Hook. from Shmal'g., Fl. I (1895) 426.— Ic.: Gmel. Fl. Sib. I, tab. 42 et 43.— Exc.: G. R. F. No. 2635.

Perennial; plant entirely glabrous; root fusiform, its neck covered with brown leaf-remnants; stem thick, ca. 1 cm across, 50–100 cm high, single, erect, sulcate, upper part with slender obliquely antrorse branches overtopping the main umbel; radical and lower cauline leaves on long (10–20 cm) petioles expanding to sheath; blade generally oblong-ovate, 8–10 cm long, 4 cm wide, tripinnatisect; lobes of the last order 2–6 mm

long, 0.3 mm wide, decurrent, linear, acute, entire or dentate or 3-lobed; upper leaves smaller, bipinnate or pinnate. Main umbel 10–15 cm across, larger than the others, of 20–30 rays, lateral umbels smaller, 10–12-rayed; involucre of 8–10 lanceolate-linear, long-acuminate, dentate or pinnatifid leaflets; umbellets many-flowered, with 6–10 mm pedicels; leaflets of involucels entire, rarely dentate, shorter than pedicels; petals white; fruit broadly ovoid, subglobose, 5–7 mm long and nearly as wide, with narrow membranous slightly curly crenate-dentate wings, and with faintly irregularly eroded surface; valliculae with small spherical tubercles. June–July.

- 243 Exposed herbaceous, sometimes stony slopes, steppe meadows, pine forests. — European part: V.-Kama, Transv., Urals; W. Siberia: U. Tob. Endemic. Described from Isetskoe District. Type in Berlin.

3. *A. darvasicum* (Lipsky) Schischk. comb. nov. — *Hymenolaena darvasica* Lipsky in Tr. Bot. Sada, XVIII, 1 (1900) 72. — *Pleurospermum darvasicum* B. Fedtsch., Rastit. Turkest. (1915) 604.

Perennial; plant entirely glabrous; root thick, to 1.5 cm across, stem 10–60 cm high, base covered with dark brown fibrous leaf-remnants; main stem at base usually bearing slightly erect, thinly ribbed, somewhat violet branches often overtopping main stem; radical and lower cauline leaves ovate, 10–20 cm long, 2.5–5 cm wide, with long petioles exceeding blade, with 2–3 pairs of broadly ovate primary lobes on short petiolules or sessile and decurrent, pinnatifid into obcuneate lobules with slightly acute ovate teeth; upper cauline leaves 1–2, smaller, simple-pinnate. Main umbel 8–12 cm across, the nearly equal 22–40 acutely ribbed, glabrous rays strongly elongating in fruit; involucre of 6–8 oblong-linear acuminate reflexed leaflets, often 2–3-partite or pinnate above, with white scarious margins below; umbellets many-flowered, 1–2 cm across; involucels of 8–10 lanceolate leaflets with scarious margins, nearly as long as umbellets, reflexed in fruit; calyx-teeth inconspicuous; petals whitish or greenish-yellowish, ovate, tapering at base, with inward curved tip; fruit broadly ovoid, 5–5.5 mm long, ca. 4 mm wide, mericarps with 5 broad nearly equal plicate-undulant wings, covered with vesicular verrucae between ribs; oil tubes absent; stylopodium flat-pulvinate; styles recurved, longer than stylopodium. July. (Plate XV, Figure 14.)

Alpine slopes, 3,000–3,400 m. — Centr. Asia: Pam.-Al. (Darvaza and Shugnan). Endemic. Described from sources of Gul'bed River and margins of Abdul-Gasan glacier. Type in Leningrad.

Series 2. *Simplices* Schischk. — Umbel rays 5–12.

4. *A. simplex* Rupr. Sert. tiansch. (1869) 49. — *A. rupestre* M. Pop. in Byull. Mosk. Obshch. ispyt. prir. nov. ser. XLIV (1935) 129, p.p. — *A. tenuisectum* Korov. in Bot. Mat. gerb. Inst. Bot. i Zool. Akad. Nauk UzSSR, XII (1948) 16. — *A. roseum* Korov. l.c. (1948) 18. —

- 244 *Albertia commutata* Rgl. et Schmalh. in Tr. Bot. Sada, V, 2 (1878) 604, ex p.

Perennial; root thick, vertical or ascending, sometimes multicapital; stem single or few, 10–50 cm high, sulcate, like leaves glabrous, erect or

ascending at base, simple or branching, sometimes leafless, often with 1 leaf; radical leaves numerous, rarely few, bi- or nearly tripinnatisect, their petioles long, as long as or 2-3 times as long as blade; blade broadly ovate to ovate-oblong, paler beneath, 3-6 cm long, 1-3.5 cm wide; primary lobes broadly ovate, incised-dentate or pinnatifid, with lanceolate or linear acute teeth (or segments). Main umbel 2-7 cm across, of 5-10 irregular, furrowed rays glabrous or slightly scarious above; involucre of 3-8 lanceolate, entire or pinnatifid leaflets with scarious margins; umbellets 5-10 mm across, with numerous, crowded pedicels; involucels of 8 lanceolate or ovate-lanceolate, nearly entire, scarious, acute leaflets, usually as long as pedicels; petals whitish-greenish or pinkish; fruit broadly ovoid, 3-4 mm long, 2.5-3.5 mm wide, with 5 winged ribs, their margins often undulant. July-August. (Plate XV, Figure 12.)

Stony coastal slopes in alpine belt, alpine meadows 3,300 m, Central Asian mountain juniper forests, herbaceous slopes. — Centr. Asia: Dzu-Tarb. (Dzungarian Ala-Tau), T. Sh., Pam.-Al. Gen. distr.: Sinkiang. Described from Tien Shan, Dzhaman-Daben and Tashrabat passes. Type in Leningrad.

Note. Typically the plant is easily distinguished from *A. anomalum* Ldb. which it sometimes closely resembles in habit, but varies markedly in its dimensions. It grows more to the south and reaches the north of Dzungarian Ala-Tau as against *A. anomalum* which is confined to Altai and the mountains along the upper Yenisei River. There are also some records of *A. anomalum* from Dzungaria and Zailiiski Ala-Tau. In habit, *A. simplex* is very close to the species of *Pachypleurum* but in the flowering stage it is easily distinguished by its extremely unequal umbel rays, while in *Pachypleurum* they are nearly equal; in fruit the winged ribs are equal, thin; in *Pachypleurum* the styles are several times as long as the stylopodium; in *A. simplex* they are shorter or slightly longer.

5. *A. turkestanicum* (Franch.) Schischk. comb. nov. — *Pleurospermum* (Hymenolaena) *turkestanicum* Franch. in Ann. Sc. Nat. XVI (1883) 295. — *A. latipennum* Pavl. in Byull. Mosk. obshch. ispyt. prir. Nov. ser. XLVII, 1 (1938) 81. — *A. pratense* Korov. in Bot. Mat. gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 17. — *Trachydium turkestanicum* Lipsky from O. and B. Fedchenko, Perech. rast. Turk. II (1909) 123.

Perennial; root elongate, cylindrical, rather thick, its neck surrounded with brown leaf remnants; stem 40-80 cm high, erect, angular, acutely ribbed in upper part, branching from middle; radical leaves 3-5, their petioles as long as or twice as long as blade; blade broadly ovate, 8-12 cm long, 4-5 cm wide, pinnatisect into ovate or obovate, 2-4 cm long, 1-1.5 cm wide sessile lobes; pinnatisect in turn into ovate cuneate lobules, incised-dentate in upper half; lower cauline leaves similar, the upper smaller and less dissected; sheaths short, narrow, with scarious margin. Umbel rays 5-12, glabrous or sometimes slightly scabrous above, thin, irregular, 2-5 cm long; leaflets of involucre 4-6, linear, with scarious margins, sometimes incised at apex, divergent, 5-6 mm long; umbellets 5-6 mm across, 10-flowered; leaflets of involucels 3-4, oblong-lanceolate or linear,

with scarious margins, nearly as long as rays; calyx-teeth small, triangular; petals clawed, with narrow inward curved tip, 1.5–1.7 mm long; stylopodium dark green or olive, flat with undulant margin; styles recurved, nearly as long as stylopodium; fruit ovoid, 4–5 mm long, with narrowly winged undulant or dentate ribs; valleculeae finely vesicular-verrucose; canals solitary in valleculeae, usually absent at commissure. July–August.

Subalpine meadows. — Centr. Asia: T. Sh. (W.)? Pam. -Al. Endemic. Described from W. Tien Shan. Type in Paris.

Subgenus 2. *Trachydiella* Schischk. subg. nov. in Addenda XV, 428. Petals slightly yellowish; leaflets of involucels much shorter than rays.

6. *A. tianschanicum* (Korov.) C. Norman in Journ. Bot. Lond. LXXVI (1938) 233. — *Trachydium tianschanicum* Korov. in Byull. Sredneaz. Gos. univ. VII, Suppl. (1924) 23. — Exs.: H. F. A. M. No. 29.

246 Perennial; root thick, vertical or oblique; stem single or few, 20–50 cm high, sulcate, like leaves glabrous, erect, slightly flexuose, leafy, branching from middle or beyond; radical leaves numerous, petioles long, abruptly expanding to sheath, the blades oblong or broadly ovatebi- or tripinnatisect, paler beneath; primary lobes pinnatisect, secondary lobes cut nearly to base into lanceolate-linear acute lobules. Umbels 2–7 cm across, of 5–10 glabrous furrowed rays; general involucre of 3–8 lanceolate leaflets with broad scarious margin, often cut into few teeth at apex; umbellets of 5–13 rays, 5–10 mm across; involucels of 2–5 lanceolate leaflets with broad scarious margins, usually shorter than pedicels, sometimes involucre absent; petals white, pink or slightly yellowish; fruit broadly ovoid, slightly compressed laterally, 2–4 mm long, with broad sometimes undulant winged ribs. June–July.

Stony slopes. — Centr. Asia: T. Sh. (W.). Endemic. Described from Aleksandr Range. Type in Tashkent.

Genus 980. **TRACHYDIUM*** Lindl.

Lindl. in Royle, Illustr. Bot. Himal. (1836) 232

Calyx-teeth inconspicuous; petals obovate, notched, with small inward curved lobule in notch; fruit ovoid or subglobose, slightly compressed laterally, slightly tapering along commissure; mericarps with 5 prominent ribs, densely covered with small white verrucae; canals single or 2 in valleculeae. Perennial low mountain herbs, with bi-tripinnate leaves.

Trachydium has up to 10 species distributed in the Himalayas, mountains of Iran and Asia Minor.

- | | | | |
|----|---|----|--------------------------------|
| 1. | Fruit 1–1.5 mm long, nearly as wide | 1. | <i>T. kopetdaghense</i> Korov. |
| + | Fruit 4 mm long, 3–3.5 mm wide | 2. | <i>T. dichotomum</i> Korov. |

* From the Greek *trachys* — rough, uneven, referring to the small verrucae which densely cover the valleculeae.



PLATE XVIIIa: 1 — *Eleutherospermum cicutarium* (M. B.) Boiss.; 2 — *Lecokia cretica* (Lam.) DC.

1. *T. kopetdaghense* Korov. in Byull. Sredneaz. Gos. univ. VII, Suppl. (1924) 23, b, note.

Perennial; root long, vertical, 3–5 mm thick, multicapital, its collar
49 densely covered with dark brown leaf remnants; stems few, 20–40 cm high, bearing from base or middle few obliquely ascending branches, like leaves glabrous; radical leaves numerous, their petioles nearly as long as blade; blade oblong, bi- or nearly tripinnatisect, with 2–4 primary lobes and small, ovate or lanceolate, 1.5–3 mm long, 0.5–1 mm wide lobules of the last order. Umbels 2–5 cm across, of (4)5(9) unequal glabrous verrucose rays; involucre of 3–5 linear-lanceolate leaflets with scarious margins, much shorter than rays; umbellets on unequal pedicels of 5–10 rays; involucels of 3–5 lanceolate nearly entire scarious leaflets, shorter than pedicels; petals yellow; fruit subglobose, small, ca. 1–1.5 mm long and nearly as wide, rather densely covered with small white verrucae; stylopodium short-conical. (Plate XV, Figure 16.)

Mountain meadows and herbaceous slopes, to 2,000 m. — Centr. Asia: Pam.-Al., Mtn. Turkm. (Kopet Dag, Kugitang). Endemic. Described from the mountains of Kopet Dag. Type in Tashkent.

2. *T. dichotomum* Korov. in Bot. mat. Gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 19.

Perennial; root rather thick, ascending or vertical, its collar densely covered with black-brown leaf remnants; stem solitary or few, 10–40 cm high, erect, like leaves glabrous, bearing nearly from base 1–3 cauline leaves and few obliquely ascending branches; radical leaves more or less numerous, their petioles usually shorter than the blades; blade oblong or ovate, 2–6 cm long, 1–3 cm wide, bi- or tripinnate with 3–5 pairs of ovate primary lobes and pinnatisect lobes of the second order; especially lower leaves pinnatifid into linear-oblong acute lobes; cauline leaves much smaller and less dissected. Umbels of 3–6 unequal slightly furrowed glabrous rays; involucre of 3–5 unequal lanceolate acute leaflets with broad scarious margins, 3–7 times shorter than umbel rays; umbellets 5–7-flowered; involucels of 3–5 lanceolate leaflets with broad scarious margins as long as or shorter than pedicels; fruit ovoid, dark, compressed laterally with filiform ribs, 4 mm long, 3–3.5 mm wide, covered with white verrucae; valliculae with 1 canal, 2 canals at commissure. June.

Stony slopes and subalpine belt. — Centr. Asia: Pam.-Al. Endemic. Described from Kugitang Range. Type in Tashkent.

250 Genus 981. **EREMODAUCUS** * Bge.

Bge. in Delect. sem. Horti Dorpat. (1843) VI; (1844) 151. — *Trachydium* subgen. *Eremodaucus* Drude in Engl. u. Prantl, *Naturl. Pflanzenfam.* III, 8 (1898) 172.

Calyx-teeth broadly triangular, inconspicuous; petals white, obcordate, with inward curved lobe; fruit cylindrical-flattened, slightly compressed laterally; stylopodium short-conical; styles divergent, stigma capitate; stylopodium with 3 acute dorsal ribs and 2 less developed lateral ribs,

* From the Greek *eremos* — desert, *daukon* — carrot.

densely covered with verrucose eminences; carpophore not separating; albumen deeply notched toward commissure. Annual, with tripinnatisect leaves.

A monotypic genus endemic to Central Asia, E. Transcaucasia, and Afghanistan.

1. *E. lehmannii* Bge. in Delect. sem. Horti Dorpat. (1843) p. VI; Rel. Lehman. in Mém. Sav. etr. Acad. Pétersb. VII (1851) 317; Boiss. Fl. or. II, 930; Lipskii in Tr. Bot. Sada, XVIII (1900) 55; Grossg., Fl. Kavk. III, 142. — *Albertia margaritifera* Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 605. — *Trachydium lehmanni* Bent. et Hook. Gen. pl. 1 (1867) 884. — Ic.: Aitchison in Trans. Linn. 2 ser. vol. III, tab. XI (1888); Drude in Engl. u. Prantl. Natürl. Pflanzenfam. III Th. 8 Abth. f. 63; H. F. A. M. No. 237.

Annual; stem 15–110 cm high, glabrous, slightly ribbed, branching; radical and lower cauline leaves with long petioles expanding to sheath; blade tripinnatisect, lanceolate-triangular or triangular; primary lobes lanceolate; upper leaves smaller, subsessile; the cauline leaves subtend reduced lateral branches appearing like bundles of leaves. Umbels of 5–15 unequal smooth rays, the central rays very short, the marginal recurved in fruit; involucre of 5 oblong leaflets sometimes pinnatifid above with broadly scarious margin, reflexed in fruit; umbellets numerous; flowers on short pedicels; leaflets of involucels 3, oval with broad scarious margins, and short mucro; calyx-teeth inconspicuous; petals white, 2–3 mm long; fruit compressed laterally, cylindrical-flattened, 3.5 mm long, 4 mm wide; after fruits abscise the pedicels, especially the marginal ones, turn into spines. May–June. (Plate XIII, Figure 2.)

Artemisia -mixed herb-feather-grass and sandy steppes near arable lands, clearings, among wheat, flax, alfalfa, on bogara (arid, non-irrigated serozem or montane chestnut soils in Central Asia), to 1,500 m. — Caucasus: 251 E. Transc. (introduced into Apsheron Peninsula); Centr. Asia: Syr D., Amu D., Mtn. Turkm., Pam.-Al. Gen. distr.: Iran. (N. Iran, Afghanistan). Described from Katta-Kurgan near Bukhara. Type in Paris.

Genus 982. **LECOKIA*** DC.

DC. Collect. des Mém. V (1829) 67

Flowers bisexual or polygamous; calyx-teeth short; petals obovate, with inward curved tip; fruit elliptic or ovoid, tapering above and below, compressed laterally; stylopodium conical, with suberect hardening styles; mericarps subcircular in cross section, the broad thick obtuse ribs covered with hamate bristles; valleculae very narrow, slit-like; stereomes large, reniform in cross section, confined to ribs; canals numerous, arranged in ring; albumen with deep furrow toward commissure. Perennial glabrous herbs, their leaves bipinnatisect, with ovate terminal lobes.

A monotypic genus distributed from Crete to Iran.

* After Henry Lecoq (1804–1871), professor of botany and director of the Botanical Garden in Clermont (France).

1. *L. cretica* (Lam.) DC. Collect. des Mém. V (1829) 67; DC. Prodr. IV, 240; Ldb. Fl. Ross. II, 359; Boiss. Fl. or. II, 931; Kozo-Pol. in Vest. Tifl. Bot. Sada, 38-39 (1916) 156; Grossg., Fl. Kavk. III, 142. — *Cachrys cretica* Lam. Dict. I (1789) 259. — *Scandix latifolia* Sibth. Fl. Graec. III (1819) tab. 284. — Ic.: Kozo-Pol., ibid., tabl. 7 (1916) Sibth. l. c. tab. 284; Tr. Yur'evsk. Bot. Sada (1914) 45 (fruit).

Perennial; plant entirely glabrous; root thick, woody; stem single, erect, 5-8 mm thick, 35-50 cm high, nearly simple, angular-ribbed; radical leaves triangular, 25-40 cm long, 20-35 cm wide, bipinnatisect, their petioles expanding to sheath; terminal lobes ovate, 4.5-7 cm long, 3-4 cm wide, cuneate or rounded at base, acuminate, entire, or 2-3-lobed, equally dentate; cauline leaves sessile on broadly ovate, inflated, membranous, semiamplexicaul sheath. Terminal umbel much larger than the others, 5-10 cm across, of 5-12 thickish, divergent, ribbed rays; lateral umbels of 10-15 long-pediceled staminate flowers; involucre 0; leaflets of involucels subulate; calyx-teeth very small, acute; petals white; fruit elliptic or ovoid, to 10-15 mm long. May. (Plate XVIIa, Figure 2.)

522 Shady forests. — Caucasus: Tal. Gen. distr.: Bal.-As. Min. (As. Min.), Iran. (N.). Described from Crete. Type in Paris.

Genus 983* **HIPPOMARATHRUM**** Hoffm. et Link
Hoffm. et Link, Fl. Port. II (1820) 411; Link, Enum. hort. Berol. I (1821) 271

Calyx-teeth distinct; petals yellow, rather broad, with inward curved tip; stylopodium short-conical, sometimes with slightly undulant margin; fruit ovoid, subglobose or wider than long, slightly compressed laterally or contracted along suture, dorsal ribs large, robust, equal, subtriangular, protruding, tuberculate, rugose or smooth; aerophores absent; ribbed stereomes strongly developed, subtriangular in cross section; further small single, often paired stereomes in the valliculae; oil tubes numerous, often irregularly arranged; carpophore 2-partite; endosperm deeply incised, with inturned margins. Tall perennials, with strongly branching stem; leaves many times pinnatipartite into strong, narrow linear, sometimes spinose lobules; umbels many-rayed; leaflets of involucre and involucels numerous, entire.

1. Terminal lobules short, thicker, strong, 3-6(9) mm long
- 2. *H. caspium* (DC.) Grossh.
- + Terminal lobules long, usually not less than 1 cm, rarely 0.8 cm 2.
2. Terminal lobules 1-2 cm long, rarely to 2.5 or 3 cm
- 1. *H. microcarpum* (M. B.) B. Fedtsch.
- + Terminal lobules thinner, longer, 4-8(9) cm long
- 3. *H. longilobum* (DC.) B. Fedtsch.

* Treatment by B. A. Fedchenko.

** From the Greek *hippos* — horse, *marathon* — fennel (horse-fennel), presumably referring to the resemblance of the leaves to those of fennel.

1. *H. microcarpum* (M.B.) B. Fedtsch. comb. nov. — *H. crispum* Koch in Nova Act. Nat. Cur. XII (1824) 136. — *Cachrys microcarpa* M.B. Tableau (1798) 113; M.B. Beschr. Länd. zw. Terek u. Kura (1800) 167; M.B. Fl. taur.-cauc. I (1808) 218. — *C. crispa* Pers. Synops. pl. I (1805) 311; Ldb. Fl. Ross. II, 357. — *Rumia microcarpa* Hoffm. Umbellifer. ed. 2 (1816) 175. — *Aegomarithrum crispum* Steud. Nomencl. ed. 2, I (1840) 30. — Ic.: Hoffm. l.c. f. tit. 3, 21; K.-Pol. Sciadoph. lineam. fig. XVII.

- 253 Perennial; plant 100–150 cm high, entirely glabrous, rarely short-hairy; stems robust, angular-ribbed, strongly branching above into opposite or whorled branches; radical leaves long-petioled, their blades oblong-ovate, 10–30 cm long, 15–20 cm wide, many times parted into filiform mucronate lobules 6–20 mm long, ca. 2 mm wide; sometimes lobules not as long (var. *brachylobum* Ldb.); cauline leaves sessile, smaller than radical. Umbels of 7–12 rays; leaflets of involucre and involucels short, linear-lanceolate, acuminate; petals yellow, glabrous; fruit oblong-globose, with thick, obtuse, verrucose ribs; calyx-teeth obtuse, shorter than stylopodium. June–July.

Dry hills and herbaceous slopes. — Caucasus: Everywhere, except for Talysh. Gen. distr.: As. Min. (eastern part), Arm.-Kurd., Iran. Described from Transcaucasia, between Kuba and Shemakha (M. Bieberstein). Cotype in Leningrad.

Note. *H. crispum* Koch., used by many authors, is not valid according to the rules of nomenclature as M. Bieberstein was the first to give it a binary name in 1798. Persoon, in his book published in 1805, referring to Bieberstein, uses the epithet "*microcarpa*" (*Cachrys microcarpa*); on the same page there is also the first description of *Cachrys crispa*, a plant of unknown origin, described after specimens cultivated in the Monier garden at Versailles.

2. *H. caspium* (DC.) Grossh., Opred. rast. Kavk. (1949) 221. — *H. amplifolium* Ldb. in C.A. Mey. Verz. Pfl. Caucas. (1831) 131. — *H. crispum* var. *crassilobum* Boiss. Fl. or. II (1872) 932. — *Echinophora aspia* DC. Prodr. IV (1830) 235. — *Cachrys amplifolia* Ldb. in Eichw. Casp.-Cauc. (1831) 6, 12. — Ic.: Eichw. l.c. tab. IX.

Perennial; plant 100–150 cm high, entirely, but especially stems and branches, short-scabrous; stems angular, strongly branching above, with opposite or whorled branches; lower leaves petiolate, oblong-ovate, many times parted into short, linear-subulate lobules; blades 20–30 cm long, 15–20 cm wide; lobules 4–6(9) mm long, 1–1.25 mm wide, stiff, acuminate, nearly spinose; cauline leaves sessile, smaller. Umbels of 7–12 rays; leaflets of involucre and involucels short, linear or linear-lanceolate, acuminate, flowers yellow; petals glabrous; fruit wider than long, the ribs thick, obtuse, verrucose; calyx-teeth obtuse, shorter than stylopodium. June.

- 254 Coastal hills. — Caucasus: E. Transc. (near Baku). Endemic. Described from Sal'yany near Baku (Ganzen collections). Type in Geneva.

3. *H. longilobum* (DC.) B. Fedtsch. ex Grossg., Opred. rast. Kavk. (1949) 221, erroneously "*longifolium*." — *H. crispum* var. *longilobum* Boiss. Fl. or. II (1872) 932. — *Cachrys longiloba* DC. Prodr. IV (1830) 237.

Perennial; plant 100–150 cm high, entirely glabrous or short haired; stems slightly angular, strongly branching above, branches opposite or whorled; leaves glabrous, rounded-ovate, many times parted into filiform mucronate lobules; radical leaves petiolate, blades 25–35 cm long, 15–25 cm wide, lobules (3)5–8.5(9.5) cm long, 1 mm wide, slightly arcuate; cauline leaves smaller, sessile. Umbels of 7–12 rays; leaflets of involucre and involucels large, linear or linear-lanceolate, acuminate; flowers yellow; petals glabrous; fruit wider than long, the ribs thick, obtuse, verrucose; calyx-teeth obtuse, shorter than stylopodium. June.

Mountain slopes. — Caucasus: S. Transc. (Karabakh). Gen. distr.: N. Iran (province of Khoi) and Azerbaidzhan. Described from the province of Khoi (Shovits). Type in Geneva.

Genus 984. **CACHRYS*** L. emend. Koch

L. Gen. pl. ed. I (1737) 75; Koch in Nov. Act. Nat. Cur. XII (1824) 135. — Cachrys sect. Eucachrys DC. Prodr. IV (1830) 236.

Calyx-teeth inconspicuous or short; petals yellow, entire with inward curved tip, fruit broadly ovoid or ovoid-oblong, with thick spongy pericarp and inconspicuous ribs; canals numerous, thin, close to surface of seed; albumen deeply concave toward commissure. Perennial herbs, with 3–4-pinnate leaves.

Of the 22 species distributed mostly in the East Mediterranean floristic region, 5 are endemics with narrow distribution areas in the Soviet Union.

- | | | |
|--------|---|--|
| 1. | Entire plant glabrous (European part) | 1. <i>C. alpina</i> M. B. |
| + | Plant more or less pubescent | 2. |
| 2. | Terminal leaf lobules 5–20 mm long, 0.5 mm wide | 3. |
| + | Terminal leaf lobules 2–4 mm long, 0.5–1 mm wide | 4. |
| 257 3. | Terminal leaf lobules glabrous, straight; umbels of 5–10 rays | |
| | | 2. <i>C. macrocarpa</i> Ldb. |
| + | Terminal leaf lobules densely covered with short stiff hairs, often arcuate; umbels of 8–15 rays | 3. <i>C. herderi</i> Rgl. |
| 4. | Stems 25–30 cm high, lobules oblong-linear, 2–3 mm long, 1 mm wide; fruit obovoid, 6–10 mm long, 5–7 mm wide | |
| | | 5. <i>C. pubescens</i> (Pall.) Schischk. |
| + | Stems 60–90 cm high; lobules linear, 3–4 mm long, 0.5–0.8 mm wide; fruit oblong-ovoid, 10–12 mm long, 4–5 mm wide | |
| | | 4. <i>C. odontalgica</i> Pall. |

Series 1. *Alpinae* Schischk. — Plant completely glabrous; fruit broadly ovoid, with inconspicuous ribs.

1. *C. alpina* M. B. Fl. taur.-cauc. I (1808) 217; DC. Prodr. IV, 237; Ldb. Fl. Ross. II, 357; Schmal'g., Fl. I, 428. — Exs.: G. R. F. No. 1721.

* From the Greek *cachrys*, its ancient Greek name.



PLATE XIX. 1 - *Cachrys macrocarpa* Ldb.; 2 - *Cryptodiscus cachroides* Schrenk.

Perennial; plant 60–100 cm high, entirely glabrous; stem erect, branching above, slightly ribbed; radical leaves broadly triangular, ternate at base, 3–4-pinnatisect, together with petioles 40–50 cm long, 50–60 cm wide, on petioles more or less long; lobules filiform or hair-like, more or less arcuate, 2.5–6 cm long, with short mucro; cauline leaves similar but smaller. Terminal umbels larger than the others, 6–8 cm across, of 8–15 glabrous rays; involucre and involucels of 3–5 bristly, linear or lanceolate, acute leaflets with scarious margin; petals yellow; fruit 1.2–1.8 cm long, 0.6–1 cm wide, ovoid, with obscure longitudinal furrows. May.

Southern mountain slopes, light oak and pine forests. — European part: L. Don (Kazanskaya village), Crim. Gen. distr.: Bal. Described from the Crimea. Type in Leningrad.

Series 2. *Macrocarpa* Schischk. — Plant pubescent; fruit ovoid, its ribs prominent, sometimes winged; terminal leaf lobules 5–20 mm long.

2. *C. macrocarpa* Ldb. Fl. alt. I (1829) 364; Fl. Ross. II, 356; Kryl., Fl. Zap. Sib. VIII, 2039. — Ic.: Ldb. Ic. pl. Fl. Ross. IV, tab. 313.

Perennial; stems few, 30–60 cm high, sulcate, covered with short stiff hairs, becoming subglabrous, branching above, its base covered with remnants of petioles; radical leaves numerous, triangular, 25–30 cm long, slightly wider, ternate at base, on short petioles; primary lobes on rather long petiolules (to 10 cm), 2–3-pinnate, lobules of the last order linear, straight, acuminate, glabrous, 5–20 mm long, 0.5–1 mm wide; petioles and sheaths covered with short hairs, becoming subglabrous; cauline leaves smaller, less finely dissected, with short sheaths. Umbels in corymbiform panicle; terminal umbels larger than the others, 12–15 cm across, of 5–10 glabrous or slightly scabrous rays; involucre of 5 short, linear or ovate leaflets with scarious margin; involucels of ovate or ovate-lanceolate, obtuse, scarious leaflets many times shorter than rays; calyx-teeth inconspicuous; petals yellow; fruit ovoid with rounded apex, 1–1.8 cm long, 0.6–1.2 cm wide, subcircular in cross section, primary ribs prominent, nearly winged, the secondary narrower; pericarp thick, spongy, separating lengthwise into 10 rhombic lobes (?). May–June. (Plate XIX, Figure 1).

Stony and herbaceous slopes, on rocks. — W. Siberia: Alt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb. (Saur). Endemic. Described from near Ust-Kamenogorsk, Bukhtarminsk and Lake Zaisan. Type in Leningrad.

3. *C. herderi* Rgl. in Tr. Bot. Sada, V, 2 (1878) 601.

Perennial; stems 30–70 cm high, single, ribbed, very short-scabrous to hairy, branching from base or middle; radical leaves broadly triangular or broadly ovate, with petioles 15–40 cm long, 7–30 cm wide, rather densely covered with short stiff hairs, 3–4-pinnate, ternate at base; primary lobes on 2.5–8 cm long petiolules; lobules of the last order linear, acuminate, often curved, 1–2 cm long, 0.5–1 mm wide, with very short stiff hairs; cauline leaves smaller, less dissected, with short sheaths. Terminal umbels larger than the others, 8–15 cm across, of 8–15 glabrous or scabrous rays; leaflets of involucre and involucels 3–7, linear with scarious margins, partly caducous; calyx-teeth inconspicuous; petals yellow, ca. 1 mm long,

with inward curved tip; fruit broadly ovoid, 1.5–2 cm long, ca. 1 cm wide, with spongy pericarp, without ribs. June.

Stony slopes. — Centr. Asia: Dzu.-Tarb. (Dzhungarian Ala-Tau). Endemic. Described from Kara Cheka. Type in Leningrad.

- 259 Series 3. *Odontalgicae* Schischk. — Plant pubescent; fruit oblong-ovoid, without noticeable ribs, terminal leaf lobules 2–4 mm long.

4. *C. odontalgica* Pall. Reise III, Anhang (1776) 720; Ldb. Fl. Ross. II 356, ex p.; Shmal'g., Fl. I, 427; Grossg., Fl. Kavk. III, 143. — Ic.: Pall. l. c. tab. G, f. 1–3; Fl. Yugo-Vost. V, Fig. 513.

Perennial; root 1–1.5 cm thick, erect, its neck covered with fibrous leaf remnants; stem 60–90 cm high, erect, ribbed, branching, like leaves with short scabrous hairs; radical leaves broadly triangular, petioles nearly as long as blade; blade 10–12 cm long, 8–13 cm wide, 3–4-pinnatisect; primary and secondary lobes petioluled, lobules of the last order linear, 3–4 mm long, 0.5–0.8 mm wide, obtuse; cauline leaves smaller, less dissected, sessile on short expanded sheath. Umbels 2–4 cm across, of 4–7 glabrous rays; umbellets 5–10-flowered; involucre and involucels of 5–7 linear-lanceolate, ciliate leaflets; calyx-teeth inconspicuous; petals yellow with inward curved tip, glabrous outside; fruit oblong-ovoid, obtusely truncate, smooth, 10–12 mm long, 4–5 mm wide, without ribs; stylopodium short-conical; styles twice as long as stylopodium, divergent, with recurved tips. Fl. May–June. Fr. June–July.

In wormwood and kokpekty steppes, solonetz meadows. — European part: Bl., L. Don, Transv., L. V., Crim. (Kerch Peninsula); Caucasus: Cisc.; Centr. Asia: Ar.-Casp. Endemic. Described [after material collected on] a journey between the Volga and Yaik (now Ural River). Type in London.

5. *C. pubescens* (Pall.) Schischk. comb. nov. — *Ferula pubescens* Pall. ex Schult. Syst. VI (1820) 598; DC. Prodr. IV, 174. — *C. odontalgica* Kryl., Fl. Zap. Sib. VIII, 2038, non Pall.

- Perennial; entire plant covered with short glandular hairs; stem 25–30 cm tall, erect, branching in upper part, its base covered with fibrous remnants of petioles; radical leaves on 1.5–5 cm petioles with oblong-ovate, 3–4-pinnate blade 4–8 cm long, 2–4 cm wide; primary lobes and basal lobes of the second order petioluled, the others sessile, lobules of the last order linear-oblong, obtuse, 2–3 mm long, 1 mm wide; cauline leaves small, slightly dissected. Umbels 2–4 cm across, of 3–7 rays gathered in paniculate inflorescence; umbellets 5–10-flowered; involucre and involucels of few small caducous leaflets; calyx-teeth inconspicuous; petals greenish-yellowish, dorsally short-haired; fruit obovoid, obtusely truncate, circular in cross section, smooth, without ribs, 6–10 mm long, 5–7 mm wide. May–June.

Sandy and solonetz steppes. — W. Siberia: Irt., Alt. (W.); Centr. Asia: Balkh., Dzu-Tarb. Endemic. Described from Siberia. Type was in Berlin.

Note. In the East the restored *C. pubescens* (Pall.) Schischk. vicariates with *C. odontalgica*.

Calyx-teeth inconspicuous; petals white, not notched, with inward curved tip; fruit geminate, with thick spongy pericarp, glabrous or densely pubescent; the marked contortion of the mericarps from base to apex has caused the stylopodium to be sunk in the slit between the mericarps and to become outwardly inconspicuous in ripe fruits; ribs 5 per mericarp, faint; albumen deeply concave. Perennial herbs with large 3-pinnatisect petiolate radical leaves.

Four species in the deserts of Central Asia and Iran.

- 1. Fruit densely white-haired 1. *C. ammophilus* Bge.
+ Ripe fruit glabrous or with sparse hairs 2.
- 2. Lower part of stems and leaves gray from dense pubescence (Muyun-Kum) 4. *C. arenarius* Schischk.
+ Plant green, less densely hairy or subglabrous 3.
- 3. Leaves deeply triangular, primary and secondary lobes petioluled ..
..... 2. *C. didymus* (Rgl.) Korov.
+ Leaves oblong, primary and secondary leaves sessile
..... 3. *C. cachroides* Schrenk.

Series 1. *Ammophili* Schischk. — Ripe fruit densely pubescent.

1. *C. ammophilus* Bge. in Mém. sav. étr. Acad. Petersb. VII (1851) 351. — *Cachrys korolkowii* Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 602. — *C. ammophila* K.-Pol. in Izv. Mosk. Obshch. isp. prir. Nov. ser. XXIX (1915) 163.

Perennial; root long, ascending, its neck covered with fibrous remnants of petioles; stem single, 40–80 cm high, erect, obtusely angular, slightly furrowed, glabrous, nearly leafless, with few thin branches; radical leaves long-petioled, canaliculate in upper part; blade ca. 20 cm long, glabrous, broadly ovate, tripinnatisect, its lobes far removed; primary lobes more or less long-petioluled, the secondary sessile or short-petioluled, the lower ternate, the upper simple, lanceolate or ovate, acute, with inward turned margins, 0.5–1.5 cm long, 1–5 mm wide; cauline leaves usually absent, rarely 1 or 2 reduced leaves on sheaths; blade pinnatisect into narrowly linear, entire lobes. Umbels 2–5 cm across, terminal on main stem and branches, long-pedunculate, of 5, rarely 3 or 6 glabrous rays; leaflets of involucre 3–5, lanceolate-subulate, with narrow scarious margins, covered with gossamer hair; involucels of 5 lanceolate, thinly acuminate, stiff-haired leaflets as long as or slightly shorter than umbels; umbellets 12-flowered, their rays very short at flowering, elongating in fruit; petals greenish, broadly ovate, abruptly tapering to very short inward curved tip, grayish-hairy outside; fruit geminate, densely white-haired, 6–7 mm long, 7–10 mm wide; stylopodium flat, blackish-greenish; styles filiform, spreading, caducous; canals numerous. April–June.

* From the Greek *cryptos* — hidden, *discos* — disk, referring to stylopodium.

Sands.— Centr. Asia: Kara K., Kyz. K., Mtn. Turkm. (Kopet Dag, Kuru-Gaudan). Endemic. Described from the unfixed sands of Batka-Kum. Endemic. Type in Leningrad.

Series 2. *Didymi* Schischk.— Ripe fruit glabrous.

2. *C. didymus* (Rgl.) Korov. in Byull. Sredneaz. Gos. univ. VII, Suppl. (1924) 23.— *Cachrys didyma* Rgl. in Tr. Bot. Sada, V (1877) 601, ex p., pl. Potanianam excl.— Exs.: H. F. A. M. No. 30.

Perennial; root vertical or ascending, 0.8–1.2 cm thick, its neck densely covered with brown leaf remnants; stem ca. 50 cm high, erect, shortly and densely scabrous-hairy, below, subglabrous in inflorescence, cylindrical, thinly sulcate, branching from middle; radical leaves short-petiolate, ovate-triangular, 15–20 cm long, 5–30 cm wide, scabrous hairy, 3-pinnatisect with primary lobes on 1–5 cm long petiolules, lobules of the last order lanceolate-linear, 2–10 mm long, 0.5–1 mm wide. Umbels 3–5 cm across, of 4–6 glabrous rays; involucre absent or of 2–3 small sometimes ciliate lanceolate leaflets; umbellets ca. 1 cm across; involucels of 5 very short
262 ca. 1 mm long, lanceolate nearly entire scarious leaflets usually with ciliate margins; ovary glabrous; stylopodium flattened with pubescent margins, hidden in ripe fruit; fruit geminate, 4–9 mm long, 6–16 mm wide; mericarp subglobular. May. (Plate XXX, Figure 1.)

Clayey or sandy deserts, wormwood-grass complexes, often solonetzic.— Centr. Asia: T. Sh. (environs of Frunze and elsewhere), Syr D. (Mogol-Tau, Mirza Chul). Type in Leningrad.

Note. The specimens from the environs of Frunze did not fully match the description of the type of *C. didymus* (Rgl.) Korov., but the material in the Herbarium of the Botanical Institute is quite inadequate. The attention of future investigators is drawn to the plants from the vicinity of Frunze.

3. *C. cachroides* Schrenk, Enum. pl. nov. I (1841) 65; Ldb. Fl. Ross. II, 367.— *C. rutaefolia* Bge. in Mém. sav. étrang. Acad. Pétersb. VII (1851) 314.— *Cachrys cryptodiscus* K.-Pol. in Izv. Mosk. Obshch. isp. prir. Nov. ser. XXIX (1915) 163.— *C. rutaefolia* K.-Pol., ibid, 163.— *C. didyma* Kryl., Fl. Zap. Sib. VIII, 2039, non Rgl.

Perennial; root 5–12 cm thick, vertical, its neck covered with fibrous leaf remnants; stems few or single, 25–60 cm high, especially in lower part densely covered with short stiff hairs, obscurely furrowed, with whorled or opposite branches; radical leaves numerous, their petioles shorter than the oblong, 10–20 cm long, 3–5 mm wide, glabrous, bi- or nearly tripinnate blade, with sessile primary pinnate lobes; secondary lobes ovate, 6–15 mm long, pinnatifid into acute ovate-lanceolate lobules; cauline leaves few, sessile on expanded sheath, smaller, not as deeply cut. Umbels of 3–6 stiff-haired or subglabrous rays; involucre of 5–7 linear glabrous acute erect leaflets shorter than umbel rays; umbellets 10–20-flowered; involucels of 5–7 linear spreading leaflets ciliate at margins; ovary densely covered with rather long hairs; unripe fruit covered with whitish thickish very short sparse hairs; mature fruit glabrous, 5–7 mm long, 8–10 mm wide; mericarps subcylindrical. April–May. (Plate XIX, Figure 2.)

Moving and fixed sands.— W. Siberia: Irt.; Centr. Asia: Balkh., Dzu.-Tarb., Syr D. Gen. distr.: sands along the Irtysh. Described from near Lake Alakul' (Schrenk) between the source of the Sassykpastau and the Arganat Mountains. Type in Leningrad.

Note. The specimens collected by Karelin and Kirillov do not mention *checachroides* Shrenk. On the label Lipsky divides them into the independent species *C. karelini* Lipsky. In view of the above specimens being inadequate for a description of the species, we are leaving this question open.

4. *C. arenarius* Schischk. sp. nova in Addenda XV, 428.
Perennial; root vertical, ca. 1 cm thick, collar densely covered with fibrous leaf remnants; stem angular, with whorled branches, densely soft-hairy in lower half, subglabrous above, 30–40 cm tall; radical leaves on long densely pubescent petioles gradually tapering to long gradually expanding sheath; blade triangular, tripinnatisect, 15–20 cm long, 10–12 cm wide, densely pubescent; primary lobes petioluled, the secondary sessile, the terminal linear, 2–7 mm long, ca. 0.5 mm wide. Umbels of 5–6 rays becoming glabrous; involucre of 2–5 linear densely pubescent leaflets; involucels of 3–5 short linear pubescent leaflets; flowers unknown; fruit 10–12 mm long, ca. 15 mm wide; mericarps subcylindrical, smooth. Fr. June.

Hilly ridge sands, wormwood-grass complex.— Centr. Asia: Balkh. (sands of Muyun-Kum). Endemic. Described from Muyun-Kum. Type in Leningrad.

Genus 986.* **PRANGOS** ** Lindl.
Lindl. in Quart. Journ. Sc.XIX (1825) 7

Calyx-teeth inconspicuous; petals yellow with inward curved tip; fruit oblong, subcircular in cross section, with broad commissure; stylopodium short-conical, often with undulant margins; mericarps subglobular; primary ribs thickish, spongy or cork-like, dorsal ribs with wing-like extensions; wings flat or undulant; canals numerous, adjacent to the broadly notched albumen with incurved margins. Rather large perennial plants, glabrous or pubescent, with many times pinnatifid leaves and filiform or lanceolate terminal lobules; leaflets of involucre and involucels numerous.

Up to 25 species in the Mediterranean area, Asia Minor, Transcaucasia, Central Asia, Iran, Afghanistan and E. India.

- | | | | | |
|----|------------------------------|-------|----|--------------------------------|
| 1. | Petals hairy outside | | 1. | <i>P. acaulis</i> (DC.) Bornm. |
| + | Petals glabrous outside | | 2. | |
| 2. | Wings straight, not undulant | | 3. | |
| + | Wings more or less undulant | | 5. | |

* Treatment by B.A.Fedchenko, revised by B.K.Shishkin.
** Indian name of the plant.

3. Fruit slightly compressed dorsally, broadly oval or subcircular in cross section. 2. *P. ferulacea* (L.) Lindl.
- + Fruit strongly compressed dorsally, narrowly oval in cross section; plant of Central Asia
4. Leaf lobes directed forward, 6–12(16) mm long 3. *P. tschimganica* B. Fedtsc.
- + Leaf lobes spreading, 4–5 mm long . . . 4. *P. isphairamica* B. Fedtsc.
5. Low plants (20–35 cm), with almost unbranched stem 5. *P. aris-romanae* Boiss. et Hue
- + Plant higher, branching stem
6. Wing slightly undulant; fruit pyriform . . . 6. *P. bucharica* B. Fedtsc.
- + Wings strongly undulant, appearing corrugated; fruit never pyriform
7. Valleculae of fruit smooth
- + Valleculae of fruit with tubercles or papillae
8. Leaf lobules filiform, attenuate 7. *P. uloptera* DC.
- + Leaf lobules flat, widening 8. *P. lipskyi* Korov.
9. Leaf lobules narrowly lanceolate, 1.1 mm wide; fruit subcylindrical, 11 mm long 12. *P. cylindrocarpa* Korov.
- + Leaf lobules filiform or linear; fruit oblong-ovoid, ovoid or cylindrical-ovoid 10.
10. Leaf lobules filiform, rarely linear, if so then short, spreading; fruit oblong-ovoid 11.
- + Leaf lobules wider, flat, linear; fruit ovoid or cylindrical-ovoid . . . 11.
11. Radical leaves rounded-triangular; plants of E. Transcaucasia 9. *P. lophoptera* Boiss.
- + Radical leaves oblong; plants of Central Asia 12.
12. Leaf lobules long (20 mm), filiform, usually directed forward 10. *P. pabularia* Lindl.
- + Leaf lobules not as long (3–8 mm), wider, more or less spreading 11. *P. saravschanica* (Rgl. et Schmalh.) Korov.
13. Pedicels thickened, shorter than or as long as fruit; terminal leaf lobules turned at a right angle 13. *P. fedtschenkoi* (Rgl. et Schmalh.) Korov.
- 265 + Pedicels thin, twice as long as fruit; terminal leaf lobules spreading 14. *P. latiloba* Korov.

1. *P. acaulis* (DC.) Bornm. in Fedde, Repert. XXXIX (1935) 122; Grossg. Opred. rast. Kavkaza (1949) 221. — *P. humilis* Fisch. in Ldb. Fl. Ross. II (1844–1846) 359. — *P. szovitzii* Boiss. in Ann. Sc. Nat. 3 sér. II (1844) 78; Boiss. Fl. or. II, 942; Grossg., Fl. Kavk. III, 144. — *Cachrys acaulis* DC. Prodr. IV (1830) 238.

Perennial; plant 10–40(50) cm high, more or less covered with curly hairs; root neck densely covered with brown leaf remnants; stems slightly faceted or subcylindrical, corymbiformly branching from middle; radical leaves petiolate, spreading on ground or ascending; petioles 10–15 cm long; blade triangular, tripinnatisect into short, 2–3 mm long, oblong-linear, acute, ca. 1 mm wide lobules; at ripening of fruit leaves enlarged; lobes of cauline leaves few, narrowly linear, elongate, 3–6 mm long. Umbels of 5–10(12) rays; leaflets of involucre and involucels linear-lanceolate,

nearly membranous; petals pubescent outside; fruit rather large, 15–16 mm long, twice as long as pedicels; wings membranous, twice as wide as diameter of wingless fruit, spongy-thickened at base, strongly and loosely undulant, with 5–6 folds, and notched-dentate margin. April–May.

Dry barren hills, solonchik soil. – Caucasus: S. Transc. (Nakhichevan).
Gen. distr.: Arm.-Kurd., Iran. Described from N. Iran. Type in Geneva.

2. *P. ferulacea* (L.) Lindl. in Brandes, Quart. Journ. Sc. London, No. 37 (1825) 7; Ldb. Fl. Ross. II, 358; Boiss. Fl. or. II, 937; Grossg., Fl. Kavk., III, 144. – *P. foeniculacea* C.A. Mey. Verz. Pfl. gesamm. im Caucas. (1831) 131. – *P. stenoptera* Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 104. – *P. alata* Grossh. in Opred. rast. Kavk. (1949) 222, non *P. alata* Benth. et Hook. ex Drude in Engl. u. Prantl, Natürl. Pflanzenf. III, 8 (1898) 174. – *Laserpitium ferulaceum* L. Sp. pl. ed. 2 (1762) 358. – *Cachrys alata* M.B. Fl. taur.-cauc. I (1808) 257. – Ic.: Tournef. Relat. Voyage II, tab. ad pag. 286.

Perennial; plant 60–150 cm high; stem base covered with fibrous leaf remnants, angular, branching, branches opposite or nearly whorled; leaves glabrous or scabrous (var. *scabrida* Boiss.); radical leaves petiolate; blade oblong-oval, 20–40 cm long, many times pinnatisect into linear-lanceolate lobules, 8–12 mm long, 0.3–0.5 mm wide; median and upper cauline leaves smaller. Umbels of 6–12 rays; leaflets of involucre and involucels lanceolate, membranous, terminated by mucro; fruit ovoid, 12–18 mm long, sometimes smaller (var. *microcarpa* Grossh.), nearly as long as pedicels; wings flat or faintly undulant, much narrower than diameter of wingless seed, sometimes not as wide as seeds, narrower than spaces of valleculeae (var. *stenoptera* B. Fedtsch.); stylopodium pulvinate; styles erect or divergent, recurved in fruit, twice as long as stylopodium. June–July.

Stony slopes. – Caucasus: Dag., S. and E. Transc., Tal. Gen. distr.: Arm.-Kurd., Iran. Described from Armenia near Korulukalezi village, in two passes west of Kars (Tournefort). Type in Paris.

Note. Tournefort's clear description and drawing leave no doubt that he referred to the Russian plant. Hence, Bieberstein's epithet *alata* (*Cachrys alata* M.B. = *Prangos alata* Grossh. non Benth. et Hook) is redundant. It is more difficult to decide whether *P. foeniculacea* C.A.M., described from Talysh by K.A. Meyer, should also be included here. According to the description, it differs by its completely glabrous leaves. However, as our observations of this cycle indicate an unusually varied pubescence, this cannot serve as a specific character. The same applies to the width of the wings, which either exceeds the width of the valleculeae or is narrower.

This species seems to be limited to the above noted regions, as all the European specimens seen proved markedly different from the original *P. ferulacea* (L.) Lindl. and should be referred to different species (*P. cylindracea* DC., *P. carinata* Gris.).

3. *P. tschimganica* B. Fedtsch. in Bull. Herb. Boiss. VII (1899) 180. – O. and B. Fedchenko, Perech. rast. Turkest. III (1909) 122.

Perennial; plant 75–150 cm high, entirely glabrous or subglabrous; stems angular, strongly branching above; radical leaves petiolate; blade oblong, 25–40 cm long, pinnatipartite, or bipinnatipartite, terminal lobules linear-filiform, 6–12(16) mm long, 0.5 mm wide, directed forward or slightly backward; cauline leaves subsessile or sessile, smaller. Umbels of 12–20 rays; leaflets of involucre and involucels lanceolate, short; fruit oblong, ovoid, 16–17 mm long; wings whitish, flat or slightly undulant, lateral wings nearly twice as wide as the median; valliculae smooth. June.

- 267 Shrubby forb cover on mountain slopes. – Centr. Asia: T. Sh. (western T. Sh., upper reaches of the Angren, Chimgan). Endemic. Described from Pesochny pass near Chimgan (O. and B. Fedchenko). Type in Leningrad.

4. *P. isphairamica* B. Fedtsch. sp. nov. in Addenda XV, 428.

Perennial; plant 60–80 cm high; stems angular, with elongate antrorse branches above middle; radical leaves petiolate; petioles with brown-scarious base, ca. 20 cm long; their blades broadly oval, 30–35 cm long, 20–25 cm wide, ternate with 3 pinnatipartite, short-petioled lobes; terminal lobules spreading, slightly scabrous or nearly smooth, flat, linear, with small mucro, 5–8 mm long, ca. 1 mm wide; cauline leaves sessile, smaller. Inflorescence of 8–15 rays; leaflets of involucre and involucels linear-lanceolate, short; pedicels exceeding fruit; fruit distinctly compressed dorsally, oblong-ovoid, 12–14 mm long, 7 mm wide; wings spongy at base, membranous, narrow, hardly exceeding width of valliculae; lateral wings twice as wide as the dorsal; commissure oblong-oval. May–June.

Pebbly and stony slopes, lower mountain zone. – Centr. Asia: Pam.-Al. (Alai Range). Endemic. Described from the Isfairam River basin, along the Genichek River (Drobov), Alai Range.

Note. Very close to *P. tschimganica* B. Fedtsch., from which it is readily distinguished by the characteristic arrangement of the leaf lobes. In addition to the type, collected with ripe fruits by V. Drobov (1915), we also have good flowering specimens collected by N. Androsov (1910).

5. *P. arcis-romanae* Boiss. et Huet in Boiss. Diagnos. pl. nov. or. 2 ser. fasc. 1 (1853) 105; Boiss. Fl. or. II, 940; Grossg., Fl. Kavk. III, 144. – *P. goktschaica* O. et B. Fedtsch. in Bull. Herb. Boiss. 2 sér. I (1901) 963.

- 268 Perennial; plant 20–35 cm high; root slightly thickened, its neck densely covered with black-brown fibrous leaf remnants; stems slightly branching from middle up, like petioles short-haired; radical leaves spreading on ground or ascending, short-petioled, 4–6 cm long; blade 7–10 cm long, ternate, the bipinnate lobes with 3–5 mm long, 1 mm wide, crowded-sessile, linear or oblong-linear glabrous lobules with small mucro; cauline leaves few, much smaller, sometimes reduced to 1 sheath on which other lobules sessile. Umbels of 5–8 rays; leaflets of involucre and involucels linear-lanceolate, short; fruit oblong-ovoid, 12–14 mm long, 2–3 times as long as pedicels; wings of fruit reddish, faintly undulant with slightly notched margin as wide as fruit across; commissure of fruit narrow, oblong-oval. June–July.

Dry places, southern clayey slopes, rarely in pine forests. – Caucasus: S. Transc. (Shakhdag Mountains, mountain near Lake Zevla, Güney near

Ardanuc). Gen. distr.: Arm.-Kurd. (Erzerum, Baiburt, Oltu). Described from environs of Erzerum. Type in Geneva.

6. *P. bucharica* B. Fedtsch. in Bull. Herb. Boiss. VII (1899) 179; Lipskii in Tr. Bot. Sada, XVIII, 1 (1900) 67; O. and B. Fedchenko, Perech. rast. Turkest. III (1909) 122.

Perennial; plant 25–60 cm high, entirely glabrous or slightly scabrous; base covered with rather long pale brown fibrous leaf remnants, faceted or angular, bearing declinate branches nearly from middle; lower leaves petiolate, petioles 15–30(35) cm long, their blades oblong, 20–40 cm long, 6–10 cm wide; cauline leaves smaller, sessile; all leaves many times pinnatipartite into narrowly linear lobules, 4–6 mm long, 0.75–1 mm wide. Umbels of numerous (12–20) rather long rays; some umbellets pistillate, others only staminate; leaflets of involucre and involucels short, linear-lanceolate, sometimes dissected into few linear-filiform lobes; pedicels as long as fruit or slightly longer; mature fruit 18–20 mm long, subglobose, diameter nearly equal to or even slightly longer than fruit; fruit without wings broadly obpyriform; wings whitish, slightly thickening at base, half as wide as fruit, spongy, elsewhere membranous, margins undulant, with 8–10 folds, finely tuberculate. April–May.

Herbaceous slopes, foothills, 800 to 2,000 m. – Centr. Asia: Pam.-Al. (southern slopes in the east to Darvaza). Endemic. Described after the Gayer collections from S. Bukhara, Shirmat Mountains. Type in Leningrad.

7. *P. uloptera* DC. Prodr. IV (1830) 239; Ldb. Fl. Ross. II, 359; Boiss. Fl. or. II, 940; Grossg., Fl. Kavk. VII, 124. – Exs.: H. F. A. M. No. 319a, 319b.

Perennial; plant 50–80 cm high; stems erect, strongly branching, their base densely covered with fibrous leaf remnants; radical leaves large, petioles expanding at base, membranous; blades rounded-ovate, many times pinnatipartite; terminal lobules glabrous or slightly scabrous, filiform-linear, 10–25 mm long, 0.75–1 mm wide; cauline leaves sessile, many times dissected, their lobules longer than those of the radical leaves. Umbels of 12–20 rays; leaflets of involucre and involucels linear-lanceolate; fruit oblong-cylindrical, 15–18 mm long, long-pedicel; wings whitish, spongy at base, elsewhere membranous, finely plicate, with 8–10 folds, as wide as diameter of wingless fruit; valliculae smooth, not tuberculate. June–July.

Loess and stony hills in foothills. – Caucasus: S. Transc. (Karabakh, Nakhichevan, Ordubad, Erivan); Centr. Asia: T. Sh. (western extremity of Talass Ala-Tau Range, Kara-Tau Range and Khantau Mountains), Pam.-Al. (a single herbarium specimen from Dzhizman Gorge in Nura-Tau, collected by O. A. Fedchenko). Gen. distr.: Arm.-Kurd., Iran. Described from Azerbaidzhan Seidkhoz (Sovich collections). Type in Geneva, cotype in Leningrad.

8. *P. lipskyi* Korov. in Byull. Sredneaz. Gos. univ. XV, Suppl. (1927) 49. – *P. ferganensis* O. et B. Fedtsch. in B. Fedch., Rastit. Turkest. (1915) 619 (nomen). – *P. paschaatensis* B. Fedtsch. in herb. –

Perennial; plant 70–120 cm high, entirely glabrous or subglabrous; root cylindrical, 10–12 mm thick, penetrating into the soil to 40–50 cm; stems angular, branching from middle up, its base covered with dense fibrous leaf remnants; radical leaves on 6–10 cm long petioles, their blades triangular-oblong, 25–40 cm long, bipinnatipartite; terminal lobules flat, 5–8 mm long, acuminate. Umbels of 10–15 rays; leaflets of involucre and involucels lanceolate, few; fruit oblong-ovoid, 14–16 mm long, 8–11 mm wide; wings membranous, almost flat, wide, much wider than valleculeae but not exceeding diameter of wingless fruit; very faintly undulant; valleculeae smooth; commissure narrow, oblong-oval. June–July.

Forb thickets on mountain slopes, taluses and stony slopes, 850 to 2,500 m. – Centr. Asia: T. Sh. (W.), Pam.-Al. (Alai Range – a single herbarium specimen from the basin of the Isfairam River, distinguished by narrower wings of fruit. Endemic. Described from W. Tien Shan. Type in Tashkent.

9. *P. lophoptera* Boiss. in Ann. Sc. Nat. sér. 3, II (1844) 82; Boiss. Fl. or. II, 941; Grossg., Fl. Kavk. III, 145. – Ic.: Karsten-Schenk, Vegetationsbild, X, 34.

270 Perennial; plant 60–100 cm high, completely glabrous or slightly scabrous in part; stems angular, corymbiformly or verticillately branching from middle or higher, their base covered with fibrous leaf remnants; radical leaves very large, with 30–50 cm petioles, their blades subrounded, 50–70 cm across, tripartite, the lower lobe long-petioled, ternately or pinnately parted; terminal lobules narrowly linear, 6–9 mm long, 0.5–1 mm wide; cauline leaves smaller, the upper sessile, dissected into few lobes often exceeding those of lower leaves. Umbels of many rays (8–20); leaflets of involucre and involucels lanceolate-linear, short; fruit oblong, 8–12 mm long, slightly longer than pedicels; wings of fruit spongy at base, elsewhere membranous, plicate, with 8–10 folds, in width wings slightly narrower than diameter of wingless fruit; valleculeae with numerous tubercles. May–June.

Dry slopes, rocks and taluses. – Caucasus: S. Transc. (Karabakh, Nakhichevan). Gen. distr.: As. Min., Arm.-Kurd. Described from Taurus (Aucher, No. 3587). Type in Geneva.

10. *P. pabularia* Lindl. in Brandes, Quart. Journ. Sc. XIX (1824) 7; Hook. Fl. br. Ind. II (1872) 695; Boiss. Fl. or. Suppl. 265; B. Fedtsch. in Bull. Herb. Boiss. VII (1899) 170. – *Hyalolaena sewerzowi* Rgl. et Herd. in Bull. Soc. Nat. Mosc. XXXIX, II (1866) 114. – Ic.: Wall. Pl. as. rar. II, 7, tab. 212 (1832). – Exs.: H. F. A. M. No. 318.

Perennial; plant 60–175 cm high, completely glabrous or subglabrous; root thickened, penetrating deep into the ground, stems angular, branching strongly from middle, thickly covered with brown hairy leaf remnants; radical leaves in dense cluster directed upward, their petioles short at first (ca. 5 cm), later longer (ca. 20 cm); blades of leaves oblong, 30–70 cm long, 6–12 cm wide, pinnatipartite, with bipinnatipartite lobes; terminal lobes 8–15(20) mm long, linear-filiform, directed forward or slightly spreading. Inflorescence of 10–20 rays; leaflets of involucre and involucels linear-lanceolate; fruit oblong-ovoid or oblong-cylindrical,

15-18(20) mm long, 8-9 mm wide; wings membranous from base, wider than diameter of wingless fruit, corrugated-plicate, with 10-12 folds; valliculae tuberculate. June-July.

Tall herbaceous mountain meadows, often forming uninterrupted thickets, also shrubby formations and stony slopes, 900-3,200 m. - Centr. Asia: T. Sh. (west, not extending east of the Alabuga River), Pam.-Al. Gen. distr.: Him. Described from the Himalayas. Type in London.

271 **Economic importance.** The local population use the leaves as fodder. There are two forms of this plant, one of which the cattle do not eat; this is not collected. The morphological differences between these forms are small and can be observed only in nature (see: A. S. Koroleva, Dve formy yugana v ushel'e Kondara. Soobshch. Tadzhiisk. fil. AN SSSR, X (1948) 38-40). A. Koroleva established two subspecies ssp. *schirin* A. Kor. (sweet, edible) and ssp. *tez* A. Kor. (bitter, inedible). Chemical analysis of both forms conducted at the Laboratory of Alkaloids of the Chemical-Pharmaceutical Institute in Moscow revealed that the edible form (ssp. *schirin* A. Kor.) contains 0.01% of a crude mixture of alkaloids as against ten times this amount in the inedible ssp. *tez* A. Kor. (0.1%). Distillation of the fresh plant yields from 0.076 to 0.19% of a pale yellow essential oil; its odor is hardly typical.

11. *P. saravschanica* (Rgl. et Schmalh.) Korov. in Bot. mat. Gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 24. - *Hippomarathrum saravschanicum* Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 603.

Perennial: plant 70-100 cm high; root thickened; stems angular, their base densely covered with black-brown fibrous leaf remnants, branching from middle and above, branches opposite or nearly whorled; radical leaves on 15-20 cm long petioles, their blades oblong-oval, 30-45 cm long, 15-18 cm wide, pinnatipartite, with 5-7 pairs of bipinnatipartite lobes; terminal lobules slightly spreading, linear, acuminate, (3)5-8 mm long, 0.75 mm wide. Inflorescence of 10-15 rays; leaflets of involucre linear-lanceolate; pedicels rather short, shorter than ripe fruit; fruit ovoid, (9)10-12(15) mm long; wings with spongy base, membranous, plicate, with 8-10 folds; valliculae tuberculate. June.

Tall herbaceous thickets, subalpine mountain zone. - Centr. Asia: Pam.-Al. (upper reaches of the Fan River, a tributary of the Zeravshan River and its tributary Dzhidzhik-Rut). Endemic. Described from the Dzhidzhik-Rut River valley. Type in Leningrad.

Note. The specimen collected on 5 August 1893 by V. L. Komarov at Zeravshan glacier is distinguished by larger fruits and less tuberculate valliculae. We are tentatively referring it to this species.

12. *P. cylindricarpa* Korov. in Bot. Mat. gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 24.

272 Perennial; plant with scabrous pubescence or subglabrous; root neck thickened, woody, covered with fibrous leaf remnants; stem single, 70 cm high, cylindrical-angular, sulcate, branching nearly from base, upper branches opposite or whorled; leaves thickish, pale green, often scabrous beneath along midrib and margins; radical leaves on more or less long petioles; blades of lower leaves elliptic, 4 times pinnatisect; terminal lobules spreading, narrowly lanceolate, with inrolled margins, 1 cm long,

1.1 mm wide; cauline leaves smaller, sessile, not as dissected. Umbels of 8–10 3 cm long rays; leaflets of involucre 4–5, narrowly lanceolate; umbellets 10–12-flowered, outer flowers bisexual, the inner staminate; leaflets of involucels 5–6, lanceolate; calyx-teeth triangular, acute; stylopodium flat, with slightly lobate margin; styles 1.5 mm long, recurved; fruit subcylindrical, 11 mm long, $1\frac{1}{2}$ times as long as thickened pedicel, the ribs inflated, with narrow undulant margin; valliculae narrow between ribs, with 2 rows of lobate papillae; canals narrow. June–July.

Pebbly slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Yakkabag-Darya valley. Type in Tashkent.

13. *P. fedtschenkoi* (Rgl. et Schmalh.) Korov. in Acta Univers. As. Med. VIII, b (1934) 16. — *Hippomarathrum fedtschenkoi* Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 603. — *P. pachypoda* Korov. in Bot. mat. Gerb. V (1924) 73.

Perennial; plant 50–80 cm high, entirely glabrous, sometimes slightly scabrous; root sturdy, elongate, 6–8 mm thick; stems strongly angular, branching below middle, branches rather numerous, their base covered by fibrous leaf remnants; radical leaves rather rapidly dying, petiolate; petioles to 8–12 cm, sometimes expanding to a sheath; blades of radical leaves broadly oblong-oval, 20–25 cm long, 10–12 cm wide, pinnatipartite, with 10 pairs of lobes; leaf lobes elongate, bipinnate; terminal lobules flat, linear, directed forward or slightly recurved, 6–12 mm long, 0.5–1.2 mm wide; cauline leaves numerous, smaller, sessile. Umbels of 5–10 rays; leaflets of involucre and involucels linear-lanceolate, short; pedicels rather short, 5–6 mm long; fruit broadly ovoid, much longer than pedicels; ribs membranous, wide, plicate, with (10)12–15(20) folds; valliculae covered with scarious tubercles, thus entire fruit appearing crowded with tubercles and scales. May.

Stony slopes in foothills. — Centr. Asia: T. Sh. (W.), Pam.-Al. (Zervashan and east to Kshtut, Turkestan Range). Endemic. Described
273 from Alai Range between Iordam and Karakorum and from the vicinity of Khodzhen. Type in Leningrad.

14. *P. latiloba* Korov. in Byull. Sredneaz. Gos. univ. XV, Suppl. (1927) 49.

Perennial; plant 30–45 cm high, entirely glabrous or subglabrous; root thick, 6–8 mm across, penetrating 20–30 cm in ground; stems angular, branching from middle, their base covered with pale brown fibrous leaf remnants; radical leaves on 6–8 cm long petioles, their blades rounded-triangular, 18–22 cm long, ca. 15 cm wide, pinnatipartite into bipinnatipartite lobes; terminal lobules flat, linear-lanceolate, acuminate, spreading, 4–6(9) mm long, 1 mm wide; cauline leaves small or absent. Umbels of 10–15 rays; involucre of 6–10 lanceolate leaflets; involucels of 4–6 linear-lanceolate leaflets; pedicels thin, longer than fruit; fruit globose-ovoid, 8–10 mm long, the wings plicate, with 5–7 folds, wider than diameter of wingless fruit; valliculae tuberculate. May–June.

Stony mountain slopes. — Centr. Asia: Mtn. Turkm. (Kopet-Dagh Range from its western spurs to the meridian of Ashkhabad). Gen. distr.: Iran. (near Shahrud, Khorassan province). Described from mountainous part of Turkmenistan. Type in Tashkent.

Tribe 5. **HOHENACKERIEAE** Calest. in Webbia, I (1905) 133.— Flowers bisexual, in heads; calyx-teeth large, unequal, nearly spinose; petals erect; stylopodium stalked; styles at flowering short, thin; fruit pyriform, abruptly elongating to neck, 2-seeded, mericarps separating with difficulty; mericarps with 5 filiform ribs with thickened apex; canals absent; leaves entire.

Genus 987. **HOHENACKERIA** * Fisch. et Mey.

Fisch. et Mey. Ind. sem. Hort. Petrol. II (1835) 38

Calyx with acute unequal teeth; petals white; fruit ovoid, slightly compressed laterally (due to mutual pressure), heteromorphous, tapering above, with wide rim; mericarps subcircular in cross section, with 5 equal protruding thickened ribs; all, or only the lateral ribs, with aerenchyma; 274 canals 1 under valliculae, 2–4 toward commissure; albumen flat; stylopodium short-conical, distinctly stalked; styles long, erect, rarely recurved; carpophore not divided. Perennial or annual herbs, with bi- or tripinnatisect leaves.

Two species in the Mediterranean region and in the east, to S. Transcaucasia.

1. *H. exscapa* (Stev.) K.-Pol. in Tr. Bot. sada Yur'ev.un. XV, 2–3 (1914) 120; Grande in Bull. Ort. Bot. Napoli, VIII (1929) 785; Grossg., Fl. Kavk. II, 145.— *H. bupleurifolia* Fisch. et Mey. in Ind. II sem. Hort. Petrop. (1835) 38; Ldb. Fl. Ross. II, 240; Boiss. Fl. or. II, 834.— *H. armena* Tamamsch. in Sov. Bot. XIV, 4 (1946) 220, nom.— *Valerianella exscapa* Stev. in Mém. Soc. Nat. Mosc. III (1812) 251; DC. Prodr. IV, 625.— *Fedia acaulis* Stev. l.c. III (1812) 251 et V (1817) 354; M.B. Fl. taur.-cauc. III (1819) 25.— *F. exscapa* Roem. et Schult. Syst. I (1817) 366.— Ic.: Cesati in Linnaea, XI, tab. 7.

Annual; root thin, rather long, suberect; plant acaulescent or nearly verticillately branching from base with very short, subsequently stiffening branches, 0.5–2 cm long; leaves numerous, with more or less long petioles abruptly expanding to 5–9 nerved, 1–5 cm long, 1–3 mm wide sheath with scarious margins; blades linear-lanceolate, acute, 3-nerved, thinly scabrous-crenate and scabrous along nerves beneath. Inflorescence capitate, with sessile flowers produced from root neck, nearly completely hidden by sheaths of radical leaves when young; petals white, very small, ca. 0.5 mm long, inward curved; fruit 4 mm long, 2.5 mm wide in upper part, gradually attenuate to base, abruptly tapering to neck, ca. 1 mm long, with 3–5 spreading thickish acute triangular unequal persistent sepals. Fl. April–May, Fr. May–June. (Plate XXX, Figure 2.)

Stony slopes, sandy-stony semideserts.— Caucasus: E. and S. Transc. Gen. distr.: W. and E. Med. Described from E. Transcaucasia. Type in Leningrad.

* After F.R. Hohenacker (1798–1874), collector and botanist, who for many years collected plants in Transcaucasia and enriched the herbaria of Russia.

Tribe 6. **AMMINEAE** Koch, Umbell. (1824) 114. — Flowers bisexual, very rarely unisexual or dioecious; calyx-teeth well developed or absent; petals oval or obcordate, with inward curved lobe; stylopodium conical or pulvinate; fruit cylindrical, ovoid or oblong-cylindrical, slightly compressed laterally; canals in valliculae 1–4; albumen circular or pentagonal in cross section; pericarp smooth or hairy or with transverse folds usually without crystals toward commissure.

275 Genus 988* **BUPLEURUM** ** L.

L. Sp. pl. ed.1 (1753) 236; Gen. pl. ed.5 (1754) 110

Flowers bisexual, sometimes mixed with unisexual and staminate flowers; calyx-teeth inconspicuous; petals rounded or obtriangular, with cucullate inward curved tongue-shaped lobe, usually entire, smooth, rarely dentate, with dorsal papillae; stylopodium flat, wide, as wide as or narrower than ovary; fruit globose, ovoid or linear, compressed laterally, glabrous, smooth, granular or rugose; mericarps circular or pentagonal in cross section, with 5 equal, narrow, acute, strongly protruding, often winged, rarely filiform, faintly discernible or obsolete ribs and rather wide valliculae; oil tubes often 3 in each vallicula, sometimes obsolete in ripe fruit; carpophore free, divided to base; endosperm flat or concave toward commissure, often furrowed; embryo with 2 flat cotyledons. Glabrous annual and perennial herbs or semishrubs (in the USSR, wild), rarely evergreen semishrubs and shrubs (Mediterranean), with entire leaves, and compound, usually well developed umbels (these rarely abortive, reduced to 1 ray with umbellets reduced to 1–2 flowers) and usually yellow (different shades), rarely dark brown, reddish, greenish-violet, greenish-glaucous petals.

Apparently not less than 150 species, almost exclusively in the subtropic and temperate zones of the northern hemisphere, notably the Old World. About two-thirds of the total number grow in the Mediterranean area (interpreted in the broad sense, to mean as far as the Caucasus and Central Asia in the east). About one-sixth are confined to the Himalayas and China, and about one-tenth to the temperate zones of Eurasia. There are 2 species in N. America, 3(5?) in S. Africa and 1 (introduced) in Australia.

Economic importance. The species of *Bupleurum* have not been adequately studied from the practical point of view. According to Wolf (in *Pflanzenr.* IV, 228 (1910) 24), one of the Indian species — *B. marginatum* Wall. — has edible roots. *B. falcatum* (s.l.) is reported to be used in China as a binder and stimulant. The leaves of *B. rotundifolium* L.

276 and *B. falcatum* L. were formerly used in France and probably in other countries as well, as a tincture for the treatment of wounds. According to Tison (in Baillon, *Dict. bot.* I (1876) 524), the fruits of *B. fruticosum* L. are used as a cure for rabies. Wehmer (*Die Pflanzenstoffe*, II (1931) 2 ed.) reports from Italy that depending on the seasons, different parts of *B. fruticosum* L. yield from 0.5 to 4.4% essential oil containing limonene and terpene compounds, β -phellandrene, cumic aldehyde, bupleurol ($C_{10}H_{20}O$). According to B. N. Rutovskii (*Tr. Khim.-farm. inst.*, 11 (1925)

* Treatment by I. A. Linchevskii.

** From the Greek *bupleuron* — ancient name of an unknown plant (Hippocrates, Pliny, and others).

17), flowering tops of *B. fruticosum* L. from the Crimea yield 0.89% essential oil. Wehmer (Die Pflanzenstoffe, Ergänzungsband zur zweiten Auflage (1935), 32) also reports that the stem and leaves of *B. falcatum* L. of unspecified source contain glucoside rutin (rutoside). Some interesting data recently obtained by Soviet investigators concern the medicinal potential of some species of *Bupleurum* L. and their content of alkaloids and saponins. In 1940, V. G. Vogralik discovered that infusions and decoctions of *B. scorzonnerifolium* possessed a cholagogic effect (Volodushka kak novoe zhelchegonnoe rastenie. Tezisy dokladov nauchnoi konferentsii Tomskogo meditsinskogo instituta (1914)). In an article written with E. E. Krister and S. V. Vilenchik (published 1946, in the collection "Novye lekarstvennye rasteniya Sibiri,"), V. G. Vogralik states that *B. multinerve* DC. and *B. aureum* Fisch. also have this cholagogic effect, with the latter species showing the best clinical results. Studies along these lines are continuing. N. N. Kartashova (in the same collection, II (1946) mentions V. S. Fedorova's determination of vitamin C in *B. aureum* Fisch., in the amount of 330 mg-%. P. S. Massagetov (Poiski alkaloidonosnykh rastenii v Srednei Azii. Tr. VILAR, IX, (1947) used qualitative methods to prove the presence of alkaloids in *B. aureum* Fisch., *B. exaltatum* M. B. (*B. linearifolium* DC.), *B. densiflorum* Rupr. (*B. kokanicum* Rgl. et Schmalh.). A. I. Ban'kovskii, M. P. Zarubin, and L. A. Sergeeva (Issledovanie rastenii, primenyaemykh v narodnoi meditsine, na sodержanie alkaloidov. Tr. VILAR, IX (1947) provide data on the abundance (0.5% and more) of alkaloids in the leaves and roots of *B. multinerve* DC. Z. V. Chernikova (Saponinonosnye rasteniya Sibiri i svoistva ikh saponinov. Sborn. "Novye lekarstvennye rasteniya Sibiri," III (1949)) established the presence of small quantities of saponins in *B. aureum* Fisch. (entire plant), *B. bicaule* Helm (roots) and *B. scorzonnerifolium* Willd. (roots).

Some species are also used as fodder. According to I. V. Larin 277 (Kormovye rasteniya estestvennykh senokosov i pastbishch SSSR (1937) 677), cattle readily eat *B. multinerve* DC. and *B. scorzonnerifolium* Willd. in pastures and hay, whereas *B. aureum* Fisch. is eaten only in hay, and in small quantities at that; *B. tenuissimum* L. is almost entirely avoided. The edible species further include *B. rotundifolium* L. and *B. falcatum* (in the broad sense, without indication of geographical race). According to V. A. Nikitin's observations Tadzhikistan cattle willingly feed on *B. exaltatum* M. B.

Note. *Bupleurum* L. has more than once attracted the attention of the taxonomists and several general and individual systems of the genus are known, based on the structure of the leaves (different types of venation) or the fruits, inflorescences, etc. The most recent and complete general system is due to B. M. Kozo-Polyanskii (Ischislenie russkikh vidov roda *Bupleurum* L., Tr. Peterb. Bot. Sada, XXX (1914), pp. 163-168), who also provides an extensive survey of the Russian species together with an exhaustive critical analysis of older, mostly very formalistic, systems of the genus (this refers particularly to those systems based on leaf venation).

In the present treatment Kozo-Polyanskii's divisions of the genus are followed with few exceptions. However, the interpretation of the species has been changed in several cases in favor of a more detailed delimitation

in agreement with the principles accepted in the "Flora of the USSR," as recently proposed by V. L. Komarov and E. N. Klobukova-Alisova (Opredelitel' rastenii Dal'nevostochnogo kraya (1932), A. A. Grossgeim (Flora Kavkaza, 1 ed., III (1932)), P. N. Krylov (Flora Zapadnoi Sibiri, VIII (1935)) and others and by Kozo-Polyanskii himself ("Herbarium Florae Rossicae"). It is only fair to mention that but for Kozo-Polyanskii's research, the work of Russian botanists on *Bupleurum* as well as the present treatment would have been considerably retarded.

- 278 1. Annual plants; umbels, well developed, without involucre; cauline leaves* always perfoliate, lanceolate, ovate or rounded; leaves yellow, entire, smooth, with short curved part (ligule not differentiated); stylopodium wider than ovary; oil tubes in fruit solitary in valliculae, 2 toward commissure, obsolete or nearly so in ripe fruit, hardly discernible, very rarely persistent; endosperm sulcate. (Subgenus 1. *Diatropa* (Dumort) K.-Pol.) 2.
- + Perennial or annual plants; umbels with involucre well developed or abortive; cauline leaves petioled or sessile, tapering or broadening below, sometimes more or less amplexicaul, very rarely perfoliate (but then plant perennial) 4.
2. Leaflets of involucels very unequal (3 of them 3-4 times as large as the remaining 2), much longer than umbellet . . . 1. *B. rotundifolium* L.
- + Leaflets of involucels more or less equal, about as long as or much longer than umbellet 3.
3. Cauline leaves ovate or rounded; umbels of 5-20 rays; leaflets of involucels more or less equal to umbellets, colored, yellow 2. *B. wittmannii* Stev.
- + Cauline leaves lanceolate or oblong-ovate-lanceolate; umbels of 2-3 rays; leaflets of involucels longer than umbellet, not colored, like rest of plant glaucous-green 3. *B. lancifolium* Hornem.
4. Perennial plants, with well developed umbels; leaflets yellow, rarely dark brown outside, entire, smooth, with distinct wide ligule (curved part long); stylopodium wider than ovary; fruit usually with 3 oil tubes in valliculae, and tubes along commissure very rarely cylindrical, persistent; endosperm nearly flat. (Subgenus 2. *Bupleurotypus* K.-Pol.) 5.
- + Annual plants, often with abortive short- or few-rayed umbels, leaves usually narrow, and leaflets of involucels linear or subulate; petals yellow, orange, reddish, greenish-violet, glaucous, entire, smooth or dentate, with dorsal papillae; stylopodium narrow, not wider than ovary; oil tubes along valliculae and commissure, sometimes indistinct; endosperm furrowed. (Subgenus 3. *Agostana* (S. F. Gray). K.-Pol.) 33.
5. Perennial herbs or semishrubs with lignified base (caudex); ribs of fruit low, obtuse to acute, or more or less winged. (Section 1. *Eubupleurotypus* K.-Pol.) 6.
- + Shrubs or semishrubs with evergreen leaves; ribs of fruit from nearly indistinct to acute or narrowly winged. (Section 2. *Tenorea* (Sprng.) K.-Pol.) 32. *B. fruticosum* L.

* The key refers to the median cauline leaves throughout. The shape of the lower and upper cauline leaves is often somewhat (sometimes markedly) different.

- 279 6. Leaflets of involucels small, usually lanceolate, rarely ovate-lanceolate, green 7.
- + Leaflets of involucels large, "petaloid," from rounded to ovate, usually colored (yellow), rarely green. (Subsection 2. Chrysophyton Lincz.) 11.
7. Cauline leaves expanding at base, cordate or with more or less developed auricles, more or less deeply amplexicaul. (Subsection 1. Archaeopleurum Lincz.) 8.
- + Cauline leaves tapering at base, not amplexicaul, rarely linear or slightly expanding and shallowly amplexicaul (*B. polyphyllum* Ldb., *B. polymorphum* Alb.). (Subsection 3. Arpopleurum Lincz.) 18.
8. Cauline leaves large (to 6–15 cm long), oblyrate, at base cordate or with large auricles (Transbaikalia – Far East) 9.
- + Cauline leaves smaller (to 5–6 cm long), with rather weakly developed auricles (Caucasus) 10.
9. Rays of umbellets usually long, (2)4–5 mm in flower, elongating to 10–15 mm in fruit (except var. *breviradiatum* F. Schmidt); involucels of lanceolate or elliptic-lanceolate 1–2.5(3) mm long and ca. 1 mm wide leaflets 4. *B. longiradiatum* Turcz.
- + Rays of umbellets shorter, not elongating in fruit; leaflets of involucels longer (to 4 mm) wider (to 2–2.5 mm), ovate or elliptic, rarely broadly lanceolate 5. *B. sachalinense* F. Schmidt.
10. Leaflets of involucels broadly ovate to ovate-lanceolate, 5–7-nerved, 2.5–4 mm long, 1.5–2.5 mm wide, about as long as flowering umbellets 6. *B. rischavii* Alb.
- + Leaflets of involucels ovate-lanceolate to lanceolate, 3-(5-) nerved, ca. 1.5 mm long and 1 mm wide, nearly half as long as flowering umbellets 7. *B. abchasicum* Manden.
11. Cauline leaves large (to 15 cm), more or less obtuse at base, expanding, cordate or with large auricles, often perfoliate 8. *B. aureum* Fisch.
- + Cauline leaves small (to 6–8 cm), the upper usually long-acuminate, at base expanding, usually cordate or auricled, never not perfoliate 12.
12. Leaflets of involucels large, more or less brightly colored (yellow) 13.
- + Leaflets of involucels smaller, green or faintly greenish-yellowish or green with glaucescent blue or reddish-violet 16.
13. Umbels of numerous, 5–15(20), long (3–9 cm) rays; plants rather tall (25)50–100 cm 14.
- 280 + Umbels of few, 2–4 (often 3, rarely (Far East) to 15), short (1–2.5 cm) rays; low, 10–25(35) cm, alpine or subalpine plant (from Altai to the Far East, northeast to Kamchatka and Chukchi) 12. *B. triradiatum* Adams.
14. Leaflets of involucels usually 5 (rarely 6) 15.
- + Leaflets of involucels usually 4 (rarely 5–6) (Central Asia) 11. *B. gulgzensense* O. et B. Fedtsch.
15. Involucres of 2–4(7) oblong-ovate or lanceolate leaflets usually $\frac{1}{2}$ to $\frac{3}{4}$ the length of the umbels; stems usually branching above, much exceeding radical leaves 9. *B. multinerve* DC.

- + Involucres of 2 long lanceolate leaflets, one of which is as long as the umbel (4.5–6 cm); stems simple, low (25–35 cm), only slightly longer than radical leaves (Altai) 10. *B. longinvolucratum* Kryl.
16. Cauline leaves more or less cordate at base or distinctly auricled 17.
- + Cauline leaves expanding at base, not cordate, without auricles; leaflets of involucels greenish-yellowish (E. Siberia-Transbaikalia and basin of the Aldan River) 15. *B. sibiricum* Vest.
17. Petals dark brown outside (Central Asia) 13. *B. densiflorum* Rupr.
- + All petals golden yellow or dark orange (Caucasus) 14. *B. nordmannianum* Ldb.
18. Stems few, more or less thin; perennial plants 19.
- + Except in very rare cases, stems always single, thick (to 5–10 mm); biennial-perennial or monocarpic (?) plants 32.
19. All petals yellow 20.
- + Petals dark brown outside, very rarely all yellow (Central Asia-Tien Shan) 30. *B. tianschanicum* Freyn.
20. Radical leaves rather wide, ovate-elliptic to subrounded 21.
- + Radical leaves rather narrow, lanceolate or oblanceolate, narrowly spatulate to linear-lanceolate or linear 22.
21. Cauline leaves linear or lanceolate to rounded-ovate; leaflets of involucels linear or linear-lanceolate 16. *B. falcatum* L.
- 281 + Cauline leaves oblong-cuneate (narrowly spatulate); leaflets of involucels ovate-lanceolate 31. *B. koso-poljanskyi* Grossh.
22. Cauline leaves generally not larger, often smaller, than the radical 30.
- + Cauline leaves generally distinctly larger than the radical, rarely nearly as long 23.
23. Cauline leaves (especially the upper) slightly expanding at base and slightly amplexicaul (Caucasus) 24.
- + Cauline leaves tapering at base, not amplexicaul 25.
24. Cauline leaves wide, broadly lanceolate, rarely oblanceolate, nearly not tapering at base, more or less short-acuminate to obtuse 17. *B. polyphyllum* Ldb.
- + Cauline leaves narrow, linear-lanceolate, slightly expanding at base, long-acuminate 18. *B. polymorphum* Alb.
25. Leaflets of involucres large (to 2 cm), rarely reflexed 26.
- + Leaflets of involucres smaller (0.1–1 cm), appressed to rays, rarely more or less reflexed 27.
26. Cauline leaves 6–10 cm long, (0.3)0.5–0.8 cm wide (Caucasus) 19. *B. sosnovskyi* Manden.
- + Cauline leaves (6)8–15 cm long, (0.5)1–2(3) cm wide (Central Asia) 20. *B. krylovianum* Schischk.
27. Leaflets of involucres 1–3 mm long, appressed to rays (Central Asia) 28.
- + Leaflets of involucres 3–10 mm long, appressed to rays or more or less reflexed (Siberia and Far East) 29.
28. Umbels numerous, producing loose, more or less narrowly paniculate, nearly leafless inflorescence 21. *B. czimganicum* Lincz.
- + Umbels not numerous, not producing the semblance of an inflorescence 22. *B. badaschschanicum* Lincz.

29. Cauline leaves wide, (1.5)2.5–3.5(4) cm (Far East – Maritime Territory) 23. *B. komarovianum* Lincz.
 + Cauline leaves narrow, 0.2–0.6(0.8, rarely to 1.5) cm (Altai to Far East) 24. *B. scorzonrifolium* Willd.
30. Cauline leaves linear, rather wide (to 3–4 mm); plant usually large, to 80–150 cm tall (Crimea, Caucasus, Central Asia) 27. *B. exaltatum* M. B.
 + Cauline leaves linear to nearly subulate, narrower, 1–1.5(3) mm wide 31.
31. Stems usually erect (rarely ascending), 15–35 cm high (Altai – Transbaikalia) 25. *B. bicaule* Helm.
 282 + Stems usually spreading, rarely erect, 2–10 cm high (Altai) 26. *B. pusillum* Kryl.
32. Stems long, many times pseudo-dichotomously branching; umbellets numerous, small (Caucasus – Novorossisk and S. Crimea) 28. *B. woronowii* Manden.
 + Stems slightly branching; umbels few, large (especially the main central umbel) (Altai, Sayans) 29. *B. martjanovii* Kryl.
33. Leaflets of involucels herbaceous, not awned, usually not spinose, 1–3-nerved, usually flat, opaque; fruit smooth or scabrous (Section 1. Graminea Boiss.) 34.
 + Leaflets of involucels herbaceous-scarious, yellowing in fruit, with more or less long (1–1.5 mm) awns, semi-transparent, with transparent margin. (Section 2. Glumacea Boiss.) 43. *B. aenigma* K.-Pol.
34. Fruit smooth, without papillae or tubercles. (Subsection 1. Leiocarpa Lange em. K.-Pol.) 35.
 + Fruit scabrous, rugose-papilliform or tuberculate ("granular") (Subsection 2. Trachycarpa Lange) 41.
35. Petals glabrous, entire, smooth, very rarely (in *B. boissieri* Post) finely tuberculate dorsally 36.
 + Petals finely papilliform dorsally, dentate 40.
36. All umbels of (3)5–7(10) rays equally developed, oil tubes 3–5 in valleculae, 4–6 toward commissure 37.
 + Lateral umbels always more or less abortive; oil tubes 1 in valleculae, 2 toward commissure 38.
37. Petals greenish-violet or reddish; leaflets of involucels with 1 distinct, sometimes also with 2 indistinct nerves visible only in lower part of leaflet 33. *B. gerardii* All.
 + Petals orange or yellow; leaflets of involucels with 3 distinct nerves 34. *B. commutatum* Boiss. et Bal.
38. Petals orange or yellow 39.
 + Petals reddish (brick red) or green; stems erect, usually with more or less appressed branches 35. *B. affine* Sadl.
39. Flowers 3–5 per umbellet; petals sometimes finely tuberculate-scabrous dorsally; slightly branching plant . . . 36. *B. boissieri* Post.
 + Flowers 10–15 per umbellet; petals always smooth; plant usually strongly branching 37. *B. brachiatum* C. Koch.
40. All umbels on more or less developed pedicels, with long (axial umbels) divergent rays; lower leaves lanceolate, short-petioled; leaflets usually not hooded, yellow 38. *B. pauciradiatum* Fenzl.

- + Axial umbels more or less long-stalked, with 2-3(5) unequal erect approximate rays, remaining umbels subsessile or sessile, abortive, with one (very rarely 2) strongly reduced ray, therefore umbellets more or less sessile; all leaves linear, sessile; petals distinctly hooded, yellow, with reddish tip 39. *B. asperuloides* Heldr.
- 41. All umbels more or less well developed, the lateral umbels sometimes sessile but usually not smaller than the axial 42.
- + Lateral umbels abortive, subsessile or sessile, very small, with obsolete rays; fruit 2-3 mm long, with distinct, acute, more or less undulant ribs, valleculeae more or less rugose-tuberculate 40. *B. tenuissimum* L.
- 42. Umbel rays visibly unequal, rarely nearly so; leaflets of involucre usually much shorter than umbel rays, very rarely about as long as the shortest rays; fruit ca. 2 mm long, with thin faint ribs, valleculeae densely and finely rugose-papilliform ("granular") 41. *B. marschallianum* C. A. M.
- + Umbel rays always sharply unequal (2-3 long, the others very short); leaflets of involucres several times as long as short rays of umbels; fruit 1-1.5 mm long, with mere indication of ribs, its surface densely and finely vesicular-papilliform ("granular") 42. *B. glaucum* Rob. et Cast.

Subgenus 1. *Diatropa* (Dumort.) K.-Pol. in Tr. Bot. Sada, XXX (1914) 163. — Genus *Diatropa* Dumort. Florul. Belg. (1827) 76. — Section *Perfoliata* Godr. in Gren. et Godr. Fl. France, I (1848) 717; Wolff in Pflanzenr. IV, 228 (1910) 40. — Characteristics in the Key.

Section 1. *LAEVIA* (Briq.) K.-Pol. l. c. 163. — Subsection *Laevia* Briq. Monogr. Bupl. Alp. marit. (1897) 59. — Fruit smooth or nearly so.

- 1. *B. rotundifolium* L. Sp. pl. ed. 1 (1753) 236, excl. var. β .; Hoffm. Gen. Umbell. 113; J. Jundzill, Opis. rosl. Litw. 109; DC. Prodr. IV, 129; Ldb. Fl. Ross. II, 263; J. Waga, Fl. Polska, I, 472; Boiss. Fl. or. II, 836; Schmal'g., Fl. I, 389; Briq. Monogr. Bupl. Alp. marit. 59; O. and B. Fedch., Perech. rast. Turk. 3, 89; Fedch. and Fler., Fl. 684; Wolff in Pflanzenr. IV, 228 (1910) 41; K.-Pol. in Tr. Yur'evsk, Bot. Sada, XIII, 2, 108, in Tr. Bot. Sada, XXX, 178 and in B. Fedch., Fl. Az. Ross. 10, 1, 9; Thellung in Hegi, III. Fl. V, 2, 1106; Voron. in Tr. Bot. Sada AN SSSR, XLIII, 2 (Fl. Yugo-Vost. V) 779; Kom. and Alis., Opred. rast. Dal'nevost. 284 kr. 800; Grossg., Fl. Kavk. III (1932) 146; Kryl., Fl. Zap. Sib. VIII, 2004; Maevsk., Fl. ed. 7, 544; Grossg., Opred. rast. Kavk. 222. — Ic.: Fedch. and Fler., ibid., fig. 558; K.-Pol., ibid., 1912, tabl. 5, fig. 1, 1915, fig. 2; Hegi, l. c. f. 2411. — Exs.: Fl. cauc. exs. No. 318; Fl. exs. austro-hung. No. 2922; Fl. exs. Reip. Bohem. Slov. No. 444; Fl. Hung. exs. No. 767, I, II.

Annual; glaucescent-green, rarely partially reddening plant, with erect, cylindrical stem, 15-75 cm high, usually branching in upper part; lower leaves oblong-elliptic, tapering to base, the others (sometimes rather dense on non-branching part of stem) elliptic, ovate or rounded-ovate, obtuse or

acute, usually with very short mucro, flat or slightly obcampanulate, rounded at base, and perfoliate for $\frac{1}{3}$ – $\frac{1}{4}$, gradually diminishing above, (1)2.5–5(8) cm long, (0.5)1.5–3(5) cm wide. Umbels small, of 3–10(15) small, thick, short, unequal 0.5–1 cm long rays; involucels of 5 thick, herbaceous, gray-green (rarely yellowish) ovate or elliptic, markedly unequal leaflets more or less long-acuminate, 7–10 mm long, 5–6 mm wide, 5–9-nerved, slightly connate in lower part, much (the larger leaflets 3–5 times) exceeding umbellets; flowers 8–12(20) per umbellet, short-pedicel, about as long as flowers; petals yellow; stylopodium greenish-yellow; fruit elliptic or oblong-ovoid, dark brown, 2.5–3 mm long, with thin faintly protruding filiform ribs, irregularly finely rugose-tuberculate in valleculae, with 3 longitudinal furrows the median of which is deeper and more distinct; oil tubes disappearing. Fl. May–July, Fr. June–August. (Plate XX, Figure 1.)

Fields, fallow land, populated areas, apparently always as a weed. — European part (?): Balt. (southern part), U. Dnp., M. Dnp., V.-Don, U. Dns., Bes., Bl., Crim., L. Don, L. V. (Kuma River valley); Caucasus: everywhere (except for high mountains); W. Siberia: Ob (Kolyvan), Irt. (Slavgorod); Far East: Uss. (rarely); Centr. Asia: Mtn. Turkm. (Ashkhabad, Chuli, Sulyukli, Nukhur). Gen. distr.: Scand. (southern part), Centr. and Atl. Eur., Med. (W. and E.), Bal.-As. Min., Arm.-Kurd., Iran. (western part), N. Am. (introduced), Australia (introduced). Described from W. Europe. Type in London.

Note. Kozo-Polyanskii (ibid., 1914) calls attention to the two varieties, var. α opacum K.-Pol., with dull green leaves and distinctly acuminate fruits and var. β nitidum K.-Pol., with shiny yellowish-green leaves and truncate fruits.

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2. *B. wittmannii* Stev. in Bull. Soc. Nat. Mosc. XXIX, 3 (1856) 342 ("Wittmanni"); K.-Pol. in Tr. Bot. Sada, XXX (1914) 183 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 10; Grossg., Fl. Kavk. III, 146 and Opred. rast. Kavk. (1949) 22. — *B. rotundifolium* Boiss. Fl. or. II (1872) 836, p. p. non L. — *B. pseudocroceum* Wolff in Pflanzenr. IV, 228 (1910) 44; K.-Pol. in Tr. Yur'evsk. Bot. Sada, XIII, 2 (1912) 108. — Ic.: Wolff, l. c. tab. 5, f. H; K.-Pol., ibid., 1912, tabl. 5, fig. 3, 4, 1914; tabl. 2, 1915, fig. 3. — Exs.: Pl. or exs. No. 214.

Annual; yellowish, glaucous-green plant; stems 15–60 cm high, erect, rounded, usually branching in upper part; lower leaves oblong to oblong-elliptic, tapering at base, the remaining leaves oblong-ovate, more or less gradually acuminate, broadly ovate or rounded, distinctly obcampanulate, pierced by stem for about one-third their length or nearly to middle, rather sharply decreasing in size and becoming yellow above, (1)2–4(10) cm long, (1)2–4(7) cm wide. Umbels small, of 5–12(20) thin, more or less equal rays, to 2.5 cm long, longer than in preceding species; involucels of 5 thin yellow obovate nearly scarious equal leaflets, 4–6(8) mm long, 3–5 mm wide, 5–9-nerved, short-acuminate, slightly exceeding umbellets in flower, nearly equal to them in fruit; flowers to 15 per umbellet; pedicels several times as long as flowers; petals yellow; stylopodium greenish-yellow; fruit linear, dark brown, ca. 3 mm long, with thin acute faintly protruding ribs, valleculae smooth, without furrows; oil tubes disappearing (?). Fl. May–June, Fr. July. (Plate XX, Figure 2.)

Dry clayey slopes and plains, sometimes as a weed of fields and fallow land.— Caucasus: E. Transc. (central part of Kura River basin). Endemic. Described from Tbilisi district. Type in Helsinki, isotype in Leningrad.

Note 1. Kozo-Polyanskii (ibid., 1914, 183) mentions longitudinal furrows in the valliculae of the fruit of *B. wittmannii* Stev., but like his description of the general shape of the fruit, this is obviously the result of a misunderstanding. In the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR there is a specimen of this species collected by Vil'gel'ms in the Caucasus and classified and quoted by Kozo-Polyanskii as *B. pseudocroceum* Wolff. There is also a small envelope with nearly ripe fruit which clearly does not belong to this plant, whose fruits are unripe, but to *B. rotundifolium* L. The ripe fruit of *B. wittmannii* Stev. in the Herbarium of the Biological Institute comes from a single specimen collected by A. Kolkovskii near Tbilisi on 20 July 1926 (Pl. or. exs. No. 214). The present description of the species is based on this specimen.

Note 2. Kozo-Polyanskii (ibid., 1914) describes two forms: f. *obtusissimum* K.-Pol., with rounded, obtuse, sharply obcampanulate median
286 and upper leaves, and f. *acuminatum* K.-Pol., with nearly ovate, more or less acuminate, less campanulate leaves.

Section 2. RUGOSA (Briq.) K.-Pol. l.c. 163.— Subsection *Rugosa* Briq. Monogr. Bupl. Alp. marit. (1897) 62.— Fruit rugose-papilliform or granular.

3. *B. lancifolium* Hornem. Hort. Hafn. (1813) 267; Balbis, Cat. Horti Taurin. (1813) 19, nomen; Thellung in Hegi, III, Fl. V, 2, 1098, p.p. quoad var. *β heterophyllum*; Hayek, Prodr. Fl. Balc. I (1927) 982 et Rech. f. Fl. Aegaea (1943) 402, p.p. quoad var. *longifolium*; Linchevskii in Bot. mat. Gerb. BIN AN SSSR, XIII (1950) 174.— *B. heterophyllum* Link, Hort. Berol. I (1821) 262; DC. Prodr. IV, 129; Boiss. Fl. or suppl. 251; Battand. in Battand. et Trabut, Fl. Alger. II, 353; Post, Fl. of Syria etc. ed. 1, 340.— *B. protractum* Hoffgg. et Link *β heterophyllum* Boiss. Fl. or. II (1872) 836.— *B. subovatum* Link var. *β heterophyllum* Wolff in Pflanzenr. IV, 228 (1910) 48; Post, Fl. of Syria etc. ed. 2, I, 510.— "*B. lanceolatum* L." (errore) Linchevskii in Rast. res. Turkm. (1935) 67.— Ic.: Linchevskii, ibid, 1950, typus! — Exs. (sub *B. heterophyllo*): Bornm. It. pers.-turc. No. 363; Letourneux, Pl. aegypt. No. 63; Warion, Pl. Atlant. select. Nos. 131, 131a.

Annual; glaucous-green plant; stem to 30 cm high, erect simple or slightly branching, rarely subcaulescent or spreading-branching from base; lower leaves linear or linear-lanceolate, 3–6 cm long, 2–5 mm wide, median leaves much wider, lanceolate or oblong-ovate to lanceolate, perfoliate, 3–8 cm long, 1–1.5 cm wide, upper leaves distinctly shorter, likewise perfoliate, usually ovate or oblong-ovate, all leaves more or less gradually acuminate. Umbels small, of 2–3(4) short, ca. 5 mm long rays; involucels of 5 herbaceous, glaucous-green, broadly ovate or irregularly elliptic, short-attenuate-acuminate leaflets (not yellowing in flower or fruit!), ca. 5–8 mm long, 4–6 mm wide, 5–7-nerved, more or less connate,

much exceeding umbellets (1.5–2 times); flowers 8–12 per umbellet, very short pediceled; petals pale yellow; stylopodium greenish-yellow; fruiting umbellets subcapitate-crowded, fruits irregularly cylindrical-ovoid, dark brown, ca. 3 mm long, 2–2.5 mm wide, with thin filiform faintly protruding ribs, densely and finely rugose-papilliform in valliculae; oil tubes disappearing (?). Fl. May, Fr. May–June (?). (Plate XX, Figure 3.)

- 287 Foothills, clayey soils, ephemeral and ephemeral-wormwood formations (*Artemisia herba-alba* Assoc.). Centr. Asia: Mtn. Turkm. (W. Kopet Dag, vicinity of Kara-Kal, M. G. Popov). Gen. distr.: W. Med. (Algeria) and E. Med. (Cyrenaica, Egypt, Palestine, Iraq), Bal.-As. Min. (Cyprus, Crete), Iran (western part). Described from cultivated specimens grown in the Copenhagen Botanical Garden from seeds collected in Egypt and obtained from Paris in 1803. Type in Copenhagen.

Note. The synonymy shows the very confused nomenclature of this species. For further details on this, see Linchevskii (Ibid., 1950).

Subgenus 2. *Bupleurotypus* K.-Pol. in Tr. Bot. Sada, XXX (1914) 164. — Section: *Longifolia* Wolff (Pflanzenr. IV, 228 (1910) 49); *Reticulata* Godr. (Wolff, l.c. 55), *Eubupleura* Briq. (Wolff, l.c. 59, p. p. quoad subsect. *Nervosa* Godr., *Marginata* Godr., *Rigida* Drude), *Coriacea* Godr. (Wolff, l.c. 165). — Characteristics in Key.

Section 1. *EUBUPLEUROTYPUS* K.-Pol., ibid., 164. — Fruit ribs low, obtuse to acute, more or less winged; herbs or semishrubs, not evergreens.

Subsection 1. *ARCHAEOPLEURUM* Lincz. — Leaflets of involuclers rather small and narrow, lanceolate or ovate-lanceolate; cauline leaves large, more or less amplexicaul, always with more or less expressed auricles.

4. *B. longiradiatum* Turcz. in Bull. Soc. Nat. Mosc. XVII, 4 (1844) 719 (Fl. baic.-dah. No. 505) ("*longeradiatum*"); Ldb. Fl. Ross. II, 264; F. Schmidt in Mém. Acad. Sc. Pétersb. 6 sér. IX, 125 (in Maxim. Prim. fl. amur. No. 318), incl. var. *breviradiatum*; Rgl. in Mém. Acad. Sc. Pétersb. 7 sér. IV, 4, 69 (Fl. ussur. No. 211); Korzh. in Tr. Bot. Sada, XII, 343; Kom., Fl. Man'chzh. III, 1, 137, p. p. excl. "*β breviradiatum* Regel"; Kom. and Alis., Opred. rast. Dal'nevost. kr. 800. — *B. longiradiatum* var. *α* *genuinum* Wolff in Engl. Pflanzenr. IV, 228 (1910) 55; K.-Pol. in Tr. Bot. Sada, XXX (1914) 241 and in B. Fed., Fl. Az. Ross. 10, I (1915) 34. — *B. sachalinense* Sugawara, Ill. Fl. Saghalien (1940) 1381, p. p. min (? sec. icon.). — Ic.: Wolff, l.c. tab. 6, f. A–C; K.-Pol., ibid., 1915, fig. 13; Sugawara, l.c. tab. 636, fig. A, 1–4 (sub *B. sachalinensi*). — Exs.: Karo, Fl. amur. No. 382.

Perennial; stems 50–150 cm high, single or 2–3, erect, usually slightly flexuose above and repeatedly branching; leaves more or less bright green above, duller, glaucous beneath; radical leaves broadly ovate to broadly lanceolate, obtuse to more or less long-acuminate, abruptly or

288 more or less gradually tapering to long narrow petioles $1\frac{1}{2}$ to two times as long as blade, with petioles 25–35 cm long to 10 cm (often less) wide, with 7–9(15) sharp, arcuate nerves linked by numerous weak transverse nerves; lower cauline leaves similar to the radical but usually more acute; median cauline leaves sessile, with expanded base, the auricles deeply embracing the stem, tapering at first then expanding again (oblyrate), 6–15 cm long, 2.5–5 cm wide; upper leaves much smaller, with cordate, deeply amplexicaul base, ovate or broadly lanceolate, acuminate, with many parallel nerves; uppermost leaves even smaller, (0.5)1–2 cm long, (0.3)1–1.5 cm wide, often more or less netted-veined. Umbels numerous, rather large (the lateral much smaller than the axial), on rather long (to 20 cm) thin stalks, often producing the semblance of a loosely spreading paniculate inflorescence; axial umbels of 8–12(15) unequal, sometimes rather sharply unequal, thin, suberect or slightly arcuately curved, 3–6 cm long rays; involucre of 1–5 small, unequal linear or lanceolate, 1–5 mm long leaflets, appressed to rays or more or less reflexed; involucels of (3)5–6(7) lanceolate or elliptic lanceolate, acute leaflets with 3 nerves, 1–2.5(3) mm long, ca. 1 mm wide; flowers 10–15 per umbellet, on long pedicels (2)4–5 mm long in flower, elongating to 10(15) mm in fruit or nearly not stretching (var. *breviradiatum* F. Schmidt, s. s.); petals pale yellow or pinkish in buds and flower; stylopodium yellow; fruit oblong-elliptic, dark brown, more or less shiny, 3.5 mm long, with paler filiform obtuse ribs; oil tubes 3 in valliculae, 4 toward commissure. Fl. July–August, Fr. August–September. (Plate XXI, Figure 4.)

Forests, shrubby thickets, rarely in not excessively dry exposed slopes. — E. Siberia: Dau. (only eastern part of the Shilka and Argun river valleys); Far East: Ze.-Bu., Uda, Uss., Sakh. Gen. distr.: Mong. (NE, in the Dauria part), Jap.-Ch. (Manchuria, Korea, North and Central China, in the south to the province of Hupeh, Japan). Described from NE Dauria (Shilka River). Type in Leningrad.

Note 1. The Sakhalin and Japanese specimens of this species are not quite typical; they are somewhat related to var. *breviradiatum* F. Schmidt, s. s. It is this form that has been described by Sugawara (l. c. tab. 636).

289 Note 2. The interpretation of this species has been confused for a long time. The diagnosis and the type of *B. longiradiatum* var. *breviradiatum* show that in describing his species from near the mouth of the Amur, F. Schmidt (l. c.) had in mind the rather common, currently known form with relatively short umbellet rays. He did not identify this variety with *B. sachalinense* described 9 years later and distinguished by him mainly by the large, ovate leaflets of the involucels, the umbels nearly equal to the leaflets (or even exceeding them) when in flower, but by other characters than in *B. longiradiatum* var. *breviradiatum* F. Schmidt. Nevertheless, Wolf (l. c., 1914) united in his "*B. longiradiatum* var. β *breviradiatum* F. Schmidt" both *B. sachalinense* F. Schmidt and his original var. *breviradiatum* s. s., a view followed by Kozo-Polyanskii (ibid., 1914, 1915) and by nearly all the Japanese authors. The name "*B. longiradiatum* var. *breviradiatum* F. Schmidt" came to be used for the broad-leaved, Far Eastern forms from the *B. falcatum* L. cycle. Apparently this mistake

is due to Maksimovich (in herb., specimens from Pos'et Bay, 1860), followed by Komarov (ibid., 1905, 139), who (judging by the herbarium material) included specimens from Manchuria, which were more or less similar, in Maximovich's "*B. longiradiatum* β *breviradiatum* Regel." Komarov and Alisova (ibid., 1932, 800) subsequently called this "*B. breviradiatum* Rgl.", including the broader-leaved specimens, whereas the narrower-leaved specimens were referred to "*B. falcatum* L." (See also Note to *B. scorzonnerifolium* Willd. and *B. komarovianum* Lincz.

Note 3. The collections from the Far East, Manchuria and Central China (Shensi) include some very curious intermediate (hybrid?) forms between *B. longiradiatum* Turcz. and *B. falcatum* s.l. One of these, with "falcate" leaves (thus the diagnosis) and distinctly "longiradiating" umbels, was described by Wolff (l.c. 147) as *B. dielsianum* Wolff. It is difficult now to decide whether these forms are the result of recent hybridization or evidence of formative processes of the distant past (Tertiary?). But surely it is quite likely that *B. longiradiatum* Turcz. and *B. sachalinense* F. Schmidt (and probably *B. aureum* Fisch. as well) are related to the ancient complex of species from which to a certain extent the other modern groups of *Bupleurum* L. are derived.

5. *B. sachalinense* F. Schmidt in Mém. Acad. Sc. Pétersb. 7 sér. XII, 2 (1868) 135 (Reise Amurl. — Fl. sachal. No. 181); Trautf. in Tr. Bot. Sada, VIII, 3, 383 (Increm. fl. ross. No. 2264); Sugawara, Ill. Fl. Saghalien, 1381, p. p. — *B. longiradiatum* var. β *breviradiatum* Wolff in Pflanzenr. IV, 228 (1910) 55, p. p. non F. Schmidt; K.-Pol. in Tr. Bot. Sada, XXX, 241 and in B. Fedch., Fl. Az. Ross. 10, 1, 34. — *B. leveillei* Boissieu in Bull. Soc. Bot. Fr. LVII (1910) 413. — *B. multinerve* auct. nonn. fl. Jap. non DC.

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Perennial; often confused with and very close to preceding species. Basic differences: stems slightly more densely leaved; leaves slightly thicker, the cauline leaves often more or less folded longitudinally and falcately curved, with slightly undulate (?) margin, not as bright green above; umbels on shorter pedicels usually less numerous; leaflets of involucre slightly longer (to 1 cm) and wider (ovate to subrounded), more or less obtuse; leaflets of involucels longer (to 4 mm) and wider (to 2–2.5 mm), ovate or elliptic, rarely rather broadly lanceolate, slightly acuminate with 3–5 nerves, as long as flowering umbellets or slightly exceeding them; pedicels shorter, not elongating in fruit; fruit more or less cylindrical-elliptic, ca. 3 mm long, with slightly more acute, slightly winged ribs. Fl. July–August, Fr. August–September.

Shrubby thickets, herbaceous mountain slopes (Sakhalin). — Far East: Uss. (Vladivostok area: Russki Island, Povorotny Cape, Suchan River valley), Sakh. (mainly western coast?). Gen. distr.: Jap.-Ch. (Japanese Islands, Korea). Described from Sakhalin (near Due). Type in Leningrad.

Note. Apparently a predominantly island-bound species of Japan [sic]; not many localities on Sakhalin are known. Part of the reports refer to the preceding species *B. longiradiatum* Turcz., represented here, insofar as can be judged by the meager material, by not quite typical forms (with slightly larger leaflets of involucels and pedicels somewhat elongating in



PLATE XX. 1—*Bupleurum rotundifolium* L.; 2—*B. wittmannii* Stev.; 3—*B. lancifolium* Homem.; 4—*B. multinerve* DC.; 5—*B. triradiatum* Adams.; 6—*B. densiflorum* Rupr.

fruit, close to the original var. *breviradiatum* F. Schmidt). One of these was drawn by Sugawara (l.c.) as *B. sachalinense* F. Schmidt. On the mainland there is very little information on this species, although it is very probable that it occurs along the shores of the Sea of Japan north of Vladivostok, to the Tatar Straits as well as southwards to Korea.

6. *B. rischavii* Alb. in Bull. Herb. Boiss. II (1894) 450 ("Rischawi"); Grossg., Opred. rast. Kavk. (1949) 224. — *B. rischawianum* Alb. in Tr. Tifl. bot. sada, I (1895) 102 (descr. emend.); Wolff in Pflanzenr. IV, 228, 147; K.-Pol. in Tr. Bot. Sada, XXX, 239; Grossg., Fl. Kavk. III, 150. — Ic.: Wolff, l.c. tab. 17.

293 Perennial; stems usually numerous, to 50(75) cm high, thinly sulcate, more or less erect, sometimes rather thick, ca. 5 mm at base, gradually tapering above, usually thin, repeatedly spreading-branching from base, radical leaves rather numerous (?), elliptic, oblanceolate or oblong-lanceolate, obtuse, with distinctly cartilaginous margins and 7–9 rather distinct arcuate nerves, gradually or more or less abruptly tapering to more or less long, rather wide flat petioles, up to twice as long as blade, rarely shorter; leaves with petioles 8–10 cm long, 1–1.5 cm wide; lower cauline leaves similar to radical with expanded semi-amplexicaul (distinctly auricled) base, but petioles shorter, or (often?) sessile, more or less broadly lanceolate to oblong-obovate (nearly spatulate), more or less long-acuminate or rounded and obtuse, ca. 5 cm long, 1–1.5 cm wide; median and upper cauline leaves similar to the lower but much wider, ovate to rounded-ovate, more or less short thin mucro, 1–3 cm long, (0.7)1–1.5 cm wide, gradually tapering above, sometimes nearly opposite and with opposite branches. Umbels numerous, rather large, the lateral markedly smaller than the axial, together resembling a loose, paniculate-corymbiform inflorescence, axial umbels of 10–15(18) unequal, thin, usually arcuately curved 1.5–4.5 cm long rays; involucre of (1)2–5(8) very unequal, rather wide, more or less rounded-ovate, acuminate leaflets, appressed to rays or recurved, to 5–10 mm long, very similar to upper leaves; involucels of (4)5–6 ovate, broadly ovate, sometimes obovate, rarely ovate-lanceolate, short- and thin-mucronate green leaflets with 5–7(9?) nerves, 2.5–4 mm long, 1.5–2.5 mm wide, about as long as umbellets in flower or slightly longer; flowers 10–15 per umbellet, on ca. 1.5 mm long pedicels; petals pale yellow; stylopodium brown (?); fruit oblong-ovoid, brown, ca. 3 mm long, with 4 longitudinal furrows in valliculae and low, barely winged ribs; oil ducts 3 in valliculae, 4–6 at commissure. Fl. July–August, Fr. August–September.

Calcareous rocks, upper part of forest and lower part of subalpine belts, ca. 1,500–2,000 (2,300) m; according to Wolff, K.-Polyanskii and Grossgeimer (ibid.) — "on alpine meadows." — Caucasus: W. Transc. (N. Abkhazia, rarely). Endemic. Described from Bzyb Range (Khetchi-gvara-"Hetschi-gwara"). Type in Geneva (Herb. Boiss.), isotype in Leningrad.

294 Note. A unique and rare (in the broad sense) Colchis species, certainly a relict. Like the related *B. abchasicum* Manden., another Colchis species, described below, it seems to be most closely related to the Far Eastern *B. longiradiatum* Turcz.

7. *B. abchasicum* Manden. in Bot. zhurn. SSR, XXII, 5 (1937) 454; Grossg., Opred. rast. Kavk. (1949) 224. — Ic.: Manden., ibid., fig. 2, paratypus (!).

Perennial; stem single, to 100 cm high, thinly sulcate, more or less erect, rather thick (ca. 6 mm) at base, gradually tapering above, repeatedly spreading-branched from base, or in upper part only, into long thin branches; radical leaves numerous, in dense rosette with petioles to 15 cm long, 3 cm wide, broadly obovate, more or less rounded, barely notched, nearly spatulate, margins markedly cartilaginous, with 7-9(12) rather sharp arcuate nerves, gradually tapering to rather long (3-5 mm) wide flat petioles, slightly longer than blade, somewhat expanded at base; lower cauline leaves sessile, with slightly expanded semi-amplexicaul base and small rounded auricles, more or less long-tapering, expanding to become nearly oblong-oblyrate, rounded-obtuse, to 10(20) cm long, 2.5 cm wide; median cauline leaves similar to the lower but shorter, more or less acuminate, to 5-6(14?) cm long, 2.5 cm wide; upper and uppermost leaves and leaves on branches lanceolate or oblong-lanceolate, more or less long-acuminate, gradually decreasing in size on branches to 5 mm long, sometimes nearly opposite, with opposite branches. Umbels rather small, the lateral distinctly smaller than the axial, numerous, together producing a loose, spreading inflorescence; axial umbels of 7-9(15) 1-2 cm long, unequal, sometimes very unequal, thin, erect or somewhat arcuately curved rays; involucre of 5 small, unequal, ovate or lanceolate, acute leaflets appressed to rays, 2-5 mm long; involucels of 5 ovate-lanceolate or lanceolate leaflets, shortly and thinly acuminate, 3-(5-) nerved, ca. 1.5 mm long, ca. (less) 1 mm wide appressed to rays, nearly half the length of the umbellets in flower; flowers 10-15 per umbellet, pedicels ca. 1.5-2 mm; petals pale yellow; stylopodium yellow; fruit (oblong-ovoid, brown?), ca. 4 mm long, with barely protruding ribs without wings; oil tubes 3 in valliculae, 4 at commissure. Fl. July. Fr. August.

Calcareous rocks in lower broadleaved forest-mountain belt. — Caucasus: W. Transc. (Abkhazia, Gagra). Gen. distr.: Iran (northwestern part — Gilan). Described from the Gegi River basin. Type in Tbilisi, paratype in Leningrad.

- 295 Note. Close to the preceding species, from which it is distinguished by the different shape of the larger radical and (in part) cauline leaves, the distinctly smaller narrower leaflets of the involucre and involucels (the latter usually 3-, not 5-7-nerved), and the barely protruding, wingless ribs of the fruits. The latter character is not reliable as no ripe fruits of *B. rischavii* Alb. are known. The Gilan specimens (Alekseenko (1902) Nos. 272 and 313) differ slightly from the Colchis ones for example, in having the median and upper cauline leaves much narrower, nearly linear-lanceolate, which may warrant a new species.

Subsection 2. CHRYSOPHYTON Lincz. — Leaflets of involucels large, "petaloid," rounded to ovate, usually yellow, rarely green; cauline leaves rather large, nearly always expanded at base, amplexicaul, auricled, rarely perfoliate.

8. *B. aureum* Fisch. in Hoffm. Gen. Umbell. ed. 1 (1814) 115; DC. Prodr. IV, 129; Ldb. Fl. alt. I, 348; Ldb. Fl. Ross. II, 263; Turcz. in Bull. Soc. Nat. Mosc. XVII, 4, 718 (Fl. baic.-dah. No. 504); Shmal'g., Fl.

I, 389; Korsh. in Mém. Acad. Sc. Pétersb. sér. 8, VII, 1, 171 (Tent. Fl. Ross.); Kryl., Fl. Alt. II, 503; O. and B. Fedch., Perech. rast. Turk. 3, 89; Voron in Tr. Bot. Sada, XLIII, 2, 781 (Fl. Yugo-Vost. V); Kryl., Fl. Zap. Sib. VIII, 2011; Maevskii, Fl. izd. 8, 544. — *B. longifolium* var. *β aureum* Wolff in Engl. Pflanzenr. IV, 228 (1910) 52. — *B. longifolium* (? var. *α viride*), var. *β aureum* et var. *γ violaceum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 245 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 36. — *Euphorbia perfoliata* Scheutz in Kongl. Svensk. Acad. Handl. XXII, 10 (1888); after Litv. in Tr. Bot. muz. AN, V (1909) 345 (Bibl. fl. Sib. No. 1053). — Ic.: Voron., *ibid.*, fig. 514; Maevskii, *ibid.*, fig. 222. — Exs.: G. R. F. Nos. 2519a, 2519b, 2608.

Perennial; stems 25–150 cm high, single (sometimes 2–3), erect, simple or weakly branching in upper part; radical and in part also lower cauline leaves oblong-obovate or more or less broadly elliptic, obtuse, rapidly or more or less gradually tapering to rather narrow long petioles, with petiole to 20 cm long, 3–6 cm wide; median cauline leaves sessile, from nearly oblyrate to oblong-ovate or ovate, obtusely acuminate, with large auricles or cordate, subamplexicaul or perfoliate, 5–15 cm long, 2–7 cm wide; upper cauline leaves small, relatively wider, broadly ovate or subrounded, often perfoliate; uppermost cauline leaves usually yellowish. Umbels generally 296 few, large, the lateral distinctly smaller than the axial, axial umbels of 5–10(20) more or less equal or unequal, straight or arcuately curved, rather thin rays 5–7 cm long; involucre of 3–5 large, 1–3.5 cm long leaflets, usually broadly and unequally ovate (to subrounded), unequal, similar to upper leaves, usually yellow in flower, and after; involucels of 5(8) more or less equal, ovate, obovate, elliptic or subrounded, short-acuminate or obtuse, bright yellow, rarely more or less violet (or green), thin, scarious, 5–7-nerved (or more) leaflets, 0.5–1(2) cm long, usually much (sometimes to 5 times — f. *macranthum* Kryl.) longer than umbellets, rarely nearly as long; flowers 15–20 in umbellet, pedicels 2–5 mm; petals and stylopodium yellow; fruit oblong-elliptic, dark brown, to 4(6) mm long, with 4 longitudinal furrows in valliculae and paler, very prominent, usually winged ribs; oil tubes 3 in valliculae, 4–6 at commissure. Fl. June–July, Fr. July–August.

Sparse coniferous, mixed and broadleaved forests, forest edges, forest meadows, ravines and banks of streams, shrubby thickets, mountains to subalpine, rarely alpine, meadows. — European part: Dv.-Pech. (southern part), U. V., V.-Kama, V.-Don, Transv., U. Dns.? (see Note 2), L. Don (north-eastern part), Urals; W. Siberia: Ob (mostly in the Urals and Altai areas), U. Tob. (mostly in the Urals area), Irt. (mostly in the Urals area, Karkaralinsk Mountains in the south), Alt.; E. Siberia: An.-Say., Dau. (south of the Baikal area); Centr. Asia: Dzu-Tarb., T. Sh. (northeastern part — Kirghiz and Zailiiski Ala-Tau ranges). Gen. distr.: Centr. Eur. (?), Dzu.-Kash. (E. T. Sh.), Mong. (northwestern part). Described from specimens grown from seeds of unknown (Siberian?) origin. Type in Moscow (in Hoffmann Herbarium, preserved (?)) at M. V. Lomonosov Moscow State University).

Note 1. Wolf (l.c. 1910) and Kozo-Polyanskii (*ibid.*, 1914, 1915) regarded *B. aureum* Fisch. as a variety of *B. longifolium* L. described from Central Europe (var. *β aureum*) and distributed together with the type variety, var. *α viride*, with small, colorless [sic] green leaflets of

involucels not longer than flowering umbellets for the entire stretch of its entire distribution area, from Transbaikalia and Tien Shan to Central Europe. As we could not study Linnaeus' type of *B. longifolium*, we cannot, with certainty, identify it with the Russian form with its small green leaflets of the involucels. Therefore, we follow most Russian botanists in
 297 retaining *B. aureum* Fisch. for our species. An article by Woloszczak appeared (Was ist *Bupleurum longifolium* L. et autor.? Österr. Bot. Zeitschr. LXVI (1916) 116–118), published after Wolf and Kozo-Polyanskii's paper, states that the West European authors combined two species in "*B. longifolium*." One of these is recognized as a new species, *B. gaudini* Woloszcz. This complicates the issue even further and indicates the need for a critical reevaluation.

Note 2. M. G. Popov (Rastitel'nost' i flora Karpat (1949) 217) reports *B. longifolium* L. from Transcarpathia, from where we have never seen any collections. Could this be the original *B. longifolium* L. or *B. aureum* Fisch.?

9. *B. multinerve* DC. in Mém. Soc. phys. et hist. nat. Genève, IV (1828) 500 et Prodr. IV (1830) 130, p.p. excl. var.; Turcz. in Bull. Soc. Nat. Mosc. XVII, 4, 720 (Fl. baic.-dah. No. 507); Ldb. Fl. Ross. II, 264; Korsh. Tent. fl. Ross. or. 172; Kryl., Fl. Alt. II, 505; Kom. Fl. Man'chzh. III, 1, 141; Fedch. and Fler., Fl. 684; Wolff in Pflanzenr. IV, 228 (1910) 119, p.p. excl. syn. Vest.; Voron. in Tr. Bot. Sada, XLIII, 2 (1931) 780 (Fl. Yugo-Vost. V); Kom. and Alis., Opred. rast. Dal'nevost, kr. 800; Kryl., Fl. Zap. Sib. VIII, 2004. — *B. ranunculoides* Pall. It. II (1773) 316, 352; Ldb. Fl. alt. I, 347, p.p. excl. var. β . — *B. nervosum* Trevir. Symb. phyt. I (1831) 22. — *B. ranunculoides* β . *sibiricum* C.A.M. ex Meinsh. in Linnaea, XXX (1859–1860) 514, nomen. — *B. ranunculoides* var. β *multinerve* K.-Pol. in Tr. Bot. Sada, XXX (1914) 188 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 14. — ? *B. ranunculoides* var. α *genuinum* K.-Pol., ibid. (1914) 188 (1915) 13, p.p. — ? *B. longicaule* var. *himalayense* Wolff in Pflanzenr. IV, 228 (1910), 123, p.p. quoad pl. alt.; K.-Pol., ibid. (1914) 203. — Ic.: K.-Pol., ibid. (1915) fig. 4 (sub *B. ranunculoides*). — Exs.: G. R. F. No. 1218 and (?) No. 2520 (sub *B. ranunculoideo* var. *genuino*); P. Smirn. Pl. alt. exs. No. 57.

Perennial; stems to 50–100 cm high, few (2–3 or more), rarely single, erect, more or less flexuose, simple or more or less branching in upper part; radical and lower cauline leaves lanceolate or linear-lanceolate, 3–15(25) cm long with petioles, 0.5–1.5(3) cm wide, gradually tapering to 1–6 cm long petioles, usually short-acuminate, 5–7-(12-) nerved; median and upper cauline leaves $\frac{1}{4}$ to $\frac{1}{2}$ the length of the lower leaves, lanceolate, long-acuminate, sessile, in lower part ovate-expanding to 1–2 cm, with cordate amplexicaul base. Umbels rather large, of 5–15(20) more or less equal or slightly unequal, usually arcuately curved rays 3–6(9) cm long
 298 rays; involucre of 2–4(7) unequal, oblong-ovate, acuminate, rarely sub-lanceolate leaflets, to half the length of the rays, rarely as long; involucels of 5 obovate, abruptly shortly and thinly acuminate, rarely ovate-lanceolate, acute, 5–15-nerved, yellowish, rarely reddish-violet leaflets, 0.5–1.5(3) cm long, 0.3–0.6(1.7) cm wide, usually exceeding umbellets and concealing them, very rarely equal or slightly shorter; flowers 20–30(50) in umbellet,

pedicels thin, as long as ovary or slightly longer; petals and stylopodium yellow; fruit ellipsoid, dark brown, 3–4 mm long, with 2 longitudinal furrows in valliculae and acute, more or less winged pale ribs; oil tubes 1 in valliculae, 2 at commissure. Fl. June–July, Fr. July–August.

Dry (steppe) meadows, fine earth and stony steppe slopes, forest edges; rarely (Urals, Altai, Sayans) to lower part of alpine belt (alpine meadows, stony mountain tundra). – European part: U. Dns. (Carpathians? see Note 2), V.-Don (Voronezh Region, rarely), Urals (Central and Southern parts, at about 53–63 N); W. Siberia: Irt. (eastern part of Altai area), Ob (extreme southeastern corner, south of 55–56 N); E. Siberia: Ang.-Say. (south of 55–56 N), Dau (western part); Far East: Ze.-Bu. ("stony slopes along upper Amur" – Kom. and Alis., *ibid.*); Centr. Asia: Dzu-Tarb (Saur Range). Gen. distr.: Mong. (mountain-forest part). Described after specimens grown from seeds collected in Altai ("Sibirica Altaica"), and sent to De Candolle by Fischer, in 1826. Type in Geneva.

Note 1. According to Kozo-Polyanskii (*ibid.*, 1914), *B. multinerve* DC. is but a variety (var. β *multinerve* K.-Pol.) of the aggregate species *B. ranunculoides* L. em. K.-Pol., which also includes the type variety var. α *genuinum* Godr. (= *B. ranunculoides* L. s. s.), being distributed throughout the entire range of this aggregate species, from W. Europe to Transbaikalia. For the time being, we accept *B. multinerve* DC., widely adopted in the Russian literature since Turchanin and Ledebour, over *B. ranunculoides* L., as proposed by Kozo-Polyanskii. Nor shall we alter the status of these two species for the USSR, until a proper study of the type specimens and a monographic treatment of the entire group, on the basis of extensive good material, specially collected, are carried out. In the present treatment, *B. multinerve* remains heterogeneous, comprising a series of small forms, the importance of which
299 can be appreciated only after special observations in nature. Two forms, relatively better defined than the others, are described below: *B. longi-involucratum* Kryl. and *B. gulczense* O. and *B. Fedtsch.*

Note 2. Recent investigations indicate that the present species contains rather high amounts of alkaloids (see notes on the economic importance of the genus, page 196).

10. *B. longi-involucratum* Kryl. in Tr. Bot. Sada, XXI (1903) 17; Fl. Alt. II (1903) 506 and Fl. Zap. Sib. VIII, 2006 ("longe-involucratum"); Wolff in Pflanzenr. IV, 228, 121. – *B. ranunculoides* var. *longe-involucratum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 191 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 14.

Perennial; stems few, 25–35 cm high, erect, simple; radical and lower cauline leaves broadly linear, gradually tapering to petioles, 5–7-nerved, very long – only slightly shorter than stem – to 20–25 cm, 3.5–6 mm wide; median and upper cauline leaves narrowly lanceolate or linear-lanceolate, long-acuminate, amplexicaul with only slightly expanded base, not cordate. Umbels per stem, rather large, 5–7 rather long, to 5 cm rays; involucre of 2 unequal, lanceolate, long-acuminate leaflets, the longer (4.5–6 cm) as long as umbel, the others nearly half as long; involucels of 5–6 long-elliptic, nearly ovate-lanceolate, acuminate, yellowish-green leaflets 1.2–1.5 cm long, 5–7 mm wide, nearly twice as long as flowering umbellets; flowers

10–15 per umbellet, on rather short, ca. 3 mm, slightly unequal pedicels; petals pale yellow; stylopodium dark yellow (or violet-black?); fruit unknown in ripe state; when unripe fruit with prominent ribs; oil tubes 1 per vallecule, 2 at commissure. Fl. July, Fr. August (?).

Open stony slopes, alpine and upper part of forest belts. — W. Siberia: Alt. (Sinyukha Mountain and Tigiretskii belok (Mountains)). Endemic. Described from Tigiretskii belok. Type in Tomsk, isotype in Leningrad.

Note. A small, well-differentiated species. Krylov's original diagnosis (ibid.) describes the flowers of the Russian species as yellow ("Flores lutei..."), so does Kozo-Polyanskii (ibid.), for the stylopodium ("Stylopodia flava..."). Yet in "Fl. Zap. Sib." VIII, the stylopodium ("of epigynous disks") is reported as violet-black. The true color of the stylopodium is difficult to recognize in the herbarium specimens ("Tigiretskii belok, (mountains). Exposed stony balds below larch forests, 31 July 1891. P. Krylov"). In some cases it is dark yellow, nearly brown, in others 300 blackish, without a violet tinge, possibly owing to prolonged preservation (about 60 years).

11. *B. gulczense* O. et B. Fedtsch. in Tr. Bot. Sada, XXVIII, 1 (1908) 18; O. et B. Fedtsch. Perech. rast. Turk. 3, 89; Wolff in Pflanzenr. IV, 228, 124; K.-Pol. in Tr. Bot. Sada, XXX (1914) 196 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 18. — Ic.: O. et B. Fedch., ibid. (1908) fig. 1 (1909) fig. 4; K.-Pol., ibid. (1915) fig. 7.

Perennial; stems to 50–100 cm high, usually few (2–4), erect or more or less ascending, cylindrical, nearly smooth, more or less broadly fistular, simple or (often) with rather sparse short branches above middle; radical leaves oblong-lanceolate, rarely lanceolate, tapering to petioles, usually obtuse, 5–9-nerved, to 12 cm long, 6–15 mm wide; lower cauline leaves similar to the radical, but petioles shorter; median cauline leaves auricled; other leaves usually ovate or oblong-lanceolate, usually rounded, shorter and wider than the lower leaves, rarely more or less cordate at base, often distinctly expanding, in upper part long-acuminate, sometimes subcaudate, with numerous nerves. Umbels rather large (the axial mostly distinctly larger than the lateral), of 5–15 thin, nearly equal, more or less curved, rather long, to 3.5–7 cm rays; involucre of 3.5–7 cm rays; involucre of 3–5 more or less unequal, recurved, oblong-ovate or ovate, acute, yellowish-green leaflets (0.5)1–1.5 cm long, 0.5–1 cm wide; involucels of 4(6) broadly ovate, shortly and thinly acuminate 5–9-(15-) nerved, greenish-yellow leaflets much exceeding flowering umbellets, 6–10 mm long, 3–5 mm wide, becoming more or less scarious when dry; flowers 15–25 per umbellet, on rather short, 2–3 mm long, pedicels; petals and stylopodium yellow; fruit ovoid, violet-brown, ca. 3 mm long, with very prominent pale, more or less winged ribs; oil tubes 3 in valleculae, 4 at commissure. Fl. July–August, Fr. August–September (?).

Mountain fine earth herbaceous slopes, sometimes rocks, in woody-shrubby belt, 1,500–3,000 m. — Centr. Asia: Pam.-Al. (Alai Range in Gulcha area, Zeravshan Range, Vatan stream valley near Urmetan, lime-stones, K. Z. Zakirov), T. Sh. (Fergana Range, western slopes). Gen. distr.:? Dzu.-Kash. Described from Gulcha vicinity. Type and paratype in Leningrad.

Note. So far, this is the only reliably known representative of the *B. ranunculoides* L. cycle of Tien Shan and Pamir-Alai collected within the USSR. It is certainly closely related to *B. multinerve* DC. on the one hand and to the Himalayan *B. longicaule* Wall on the other. 01 The latter was reported for Altai by Wolf, on the basis of Dumberg's collections (which we have never seen) as well as by Kozo-Polyanskii. Yet this locality is doubtful and has not been confirmed by the newest collections. It is more likely that *B. longicaule* Wall will be found in SW Pamir-Alai (in the Gissar-Darvaza floral region, N. F. Goncharov). A curious form has been collected in the valley of the Sangardak River, between the villages of Sangardak and Dagana ("Dagana, 6 August 1878," Nevesskii). This is extraordinarily close to the type *B. longicaule* Wall. The incompleteness of the specimen (a single herbarium leaf, no ripe fruits) does not warrant its determination.

12. *B. triradiatum* Adams ex Hoffm. Gen. Umbell. ed. 1 (1814) 115 et in Nouv. Mém. Soc. Nat. Mosc. III (IX) (1834) 235; DC. Prodr. IV, 130; Ldb. Fl. Ross. II, 264; p.p. excl. specim. Kar. et Kir.; Turcz. Fl. baic.-dah I, 478; Kryl., Fl. Alt. II, 504; K.-Pol. in Tr. Bot. Sada, XXX, 198 and in B. Fedch., Fl. Az. Ross. 10, 1 14, p.p. excl. var. δ arcticum; Kom., Fl. Kamch. II, 337; Kom. and Alis., Opred. rast. Dal'nevost. kr. 800; Kryl., Fl. Zap. Sib. VIII, 2006. — *B. triradiatum* var. *alpinum* Rupr. in Beitr. Pflanzenk. Russ. Reich. IV (1845) 26. — ? *B. altaicum* Pall. ex Schult. Syst. veg. VI (1820) 368. — *B. ranunculoides* β *oblongifolium* Ldb. Fl. alt. I (1829) 348. — *B. ranunculoides* var. α *triradiatum* et var. β *oblongum* Rgl. in Nouv. Mém. Soc. Nat. Mosc. XI (XVII) (1859) 96, 97. — *B. ranunculoides* var. β *triradiatum* Wolff in Pflanzenr. IV, 228 (1910) 117. — *Diaphyllum triradiatum* Adams ex Hoffm. l. c. 115. — Ic.: Adams, l. c. (1834) tab. XIV; K.-Pol., ibid. (1915) fig. 5.

Perennial; stem 10–25(35) cm high, single or few (2–3), erect, simple or with 1–2 short branches; radical leaves linear or lanceolate, more or less tapering to petioles, obtuse or acuminate, 5–7-nerved, 3–10 cm long, 0.5–1 (1.5) cm wide; cauline leaves 2–4, sessile, ovate or oblong-ovate, more or less amplexicaul or cordate, gradually rounded, tapering or obtuse-acuminate, 5–15-nerved, distinctly shorter than radical leaves, but usually 3–4 times as wide. Umbels of 2–4 (often 3) more or less thick, unequal, erect, 1–2.5 cm long rays; involucre of 1–3(4) unequal, ovate or rounded-ovate, obtuse leaflets similar to the cauline, much shorter than umbel rays; involucels of 5–8 broadly obovate or rounded, obtuse, sometimes short-acuminate, scarious, yellow or greenish-yellow leaflets, sometimes with reddish or bluish-violet tinge, 5- to many-nerved, ca. 0.5–1 cm long, 0.5–1 cm wide, slightly longer than umbellets; flowers 15–25 per umbellet, 02 pedicels ca. 2 mm long, or almost sessile; petals reddish-brown (or violet) outside, with yellow tips; stylopodium yellow- or black-brown; fruit ovoid or oblong-ellipsoid, dark brown, cylindrical, ca. 3–4 mm long, with pale acute, more or less winged ribs; oil tubes 3 in valliculae, 4–6 or many (to 16–20) at commissure. Fl. July–August, Fr. August–September.

Forest edges in alpine and subalpine belts, meadows, stony slopes and rocks, stony tundra (bare mountains). — Arctic: Chuk., An.; W. Siberia:

Alt., Ob?; E. Siberia: Yenisei, Lena-Kol., Ang.-Say., Daur.; Far East: Kamchatka, Okhotsk, Ze.-Bureya, Uda, Ussuriysk, Sakhalin (and Kurile Islands?). **Gen. distr.:** Mongolia (high mountains of the northern, forested part), Japan-Ch. (N. Manchuria, N. Japan?). Described from the southern Baikal area, vicinity of Kultuk village; drawn by Adams (l.c. tab. 14) after a specimen collected by him on the Lena River; he collected 100 (!) specimens (l.c. 1834). Type in Moscow (Moscow University Herbarium)?, paratype in Leningrad.

Note. A critical species with a very broad distribution area. Inadequate material makes it impossible for the time being to separate some of the earlier established forms. The typical form of the species (*B. triradiatum* Adams s.s. = *B. triradiatum* var. *α adamsii* K.-Pol. l.c.) grows mainly in S. Siberia, from Altai to Transbaikalia, and reaching through a series of localities (Okhotsk coast, Kamchatka, and others) to the Far East. A more widely dispersed form from the Far East from S. Maritime Territory to Sakhalin and to Chukotka extends to Alaska. It is somewhat remarkable for its numerous umbel rays (to 10–15), narrower, obovate or sub lanceolate and acute leaflets of involucre, sometimes faintly colored, to pale green leaflets, often with rather long radical leaves, sometimes longer than or as long as stem, often multicaulescent and more or less tufted. This form was first described by Regel' (l.c. 97) after specimens collected by Eschscholtz in Alaska, near Kotzebue Sound as *B. ranunculoides* var. *δ arcticum* Rgl. (the same specimens as were cited by Ledebour (l.c. 265) for his "*B. ranunculoides*"). Kozo-Polyanskii (ibid., 1914, 1915) slightly extended Regel's var. *δ arcticum* and gave it a more precise circumscription, at the same time reducing to synonymy (ibid. (1914) 200) the binary combination (*B. arcticum* K.-Pol.). Yet if this variety is promoted to a species, it should not be attributed to Kozo-Polyanskii, who provided but a nomen provisorium, but to the author who formally publishes the binary name (see: International Code of Botanical Nomenclature, Izd. AN SSSR (1949) p. 37). With only 1 specimen available from America, the relation of this form or species to 303 *B. purpureum* Blankinship (in Montana Agric. Coll. Sc. Stud. I (1904) 89), described from N. America (Mount Baldy, Anaconda, Montana), remains unclear. In 1914 Kozo-Polyanskii (ibid., 200) identified it with *B. triradiatum* var. *γ ajanense* K.-Pol., (a small form, difficult to distinguish). In 1915 (ibid., 16) he identified it with var. *δ arcticum* K.-Pol. Kozo-Polyanskii's var. *β humile* Rupr. (ibid., 1914, 1915) apparently represents a response to unique conditions, close to melting snow spots. It is distinguished only by its low habit and quantitative characters (slightly larger leaflets of involucre), but obviously lacks geographical significance; var. *alpinum* Rupr. (l.c.) does not appear to be distinguishable from it. Owing to insufficient material from subarctic and arctic Siberia, it is not possible to determine the northern border of the distribution area of *B. triradiatum* Adams.

13. *B. densiflorum* Rupr. in Mém. Acad. Pétersb. sér. 7, XIV, 4 (1869) 47; O. and B. Fedch., Péréch. rast. Turk. 3, 90. — *B. falcatum* ssp. *persicum* var. *β densiflorum* f.l. *kokanicum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 226, an p. p.? — *B. falcatum* ssp. *persicum* var. *β densiflorum* K.-Pol. in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 23,

p.p. — *B. triradiatum* var. Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 361 (Enum. pl. Songor. No. 366). — *B. triradiatum* Ldb. Fl. Ross. II (1844) 264, p.p. quoad pl. Kar. et Kir.; K.-Pol. in Tr. Bot. Sada, XXX, 198 and in B. Fedch., Fl. Az. Ross. 10, 1, 14; Kryl., Fl. Alt. II, 504 and Fl. Zap. Sib. VIII, 2006. — *B. triradiatum* O. and B. Fedch., Perech. rast. Turk. 3 (1909) 90. — *B. ranunculoides* var. β *triradiatum* f. l. oblongum Wolff in Pflanzenr. IV, 228 (1910) 117 (in "Nota"). — ? *B. kokanicum* Rgl. et Schmahl. in Izv. Obshch. lyubit. est. antrop. i etnogr. XXXIV, 2 (1882) 29 (Descr. pl. Fedtsch. No. 72); Wolff, l. c. 173 (in "Nomina dubia"). — Ic.: K.-Pol., ibid. (1914) tabl. 3, fig. 4 (sub *B. fal-cato* ssp. persico). — Exs.: Kar. et Kir. Pl. Songor. No. 1513.

Perennial; stems usually few (2–3–8), (3) 10–15(30) cm high, produced from loosely caespitose base, rarely single, erect or more or less ascending, simple or with 1–2 short branches; radical leaves narrowly linear to narrowly lanceolate, more or less tapering to petiole, obtuse to more or less acuminate, usually 5-nerved, (2) 5–8(12) cm long, 3–5(8) mm wide; cauline leaves 1–3, sessile, linear or lanceolate, rarely to oblong-ovate, more or less amplexicaul, often slightly expanding and slightly cordate, gradually tapering above, acuminate or more or less rounded, 5–7-nerved, shorter than the radical leaves but slightly wider. Umbels of 2–3(4) rather thin, more or less straight or slightly arcuate unequal rays, (1) 2–3(7) 3(7) cm long; involucre of 1–2 (often 1) lanceolate or oblong-ovate, acuminate or more or less obtuse leaflets 0.5–1.5 cm long, 3–5 mm wide; involucels of 5–7 obovate or rounded-obovate, rarely sublanceolate, obtuse, shortly and thinly acuminate, herbaceous-scarious green leaflets, usually glaucescent-bluish, rarely with reddish-violet tinge, 3- (often 5-) nerved, ca. 4–7 mm long, 3–5 mm wide, as long as or slightly longer than umbel-lets; flowers 10–20 per umbellet, on ca. 2 mm long pedicels; petals dark brown outside (ligules paler? yellowish?); stylopodium dark brown (when dry); fruit oblong-ellipsoid, dark brown, ca. 3–4 mm long, with acute, rather broadly winged ribs; oil tubes.... Fl. July–August, Fr. August–September.

Alpine and subalpine meadows, *Cobresia* alpine meadow groups, *Juniperus turkestanica* Kom. and *Caragana jubata* (Pall.) Poir. shrubs. — Centr. Asia: Dzu-Tarb., Pam.-Al. (northern part), T. Sh. Gen. distr.: Dzu.-Kash. (E. T. Sh.). Described from Central Tien Shan (Lake Chatyr-Kul). Type in Leningrad.

Note. This species is the southern race of *B. triradiatum* Adams [sic], dispersed from Tarbagatai over Dzungaria-Ala-Tau and Tien Shan to the northern ranges of Pamir-Alai (Alai, Alai valley and Turkestan). In habit it varies from the low-growing forms of alpine meadows to the more or less high-growing, straight-stemmed and slightly more broad-leaved subalpine-forest forms. The type species, collected by Osten-Sacken in Central Tien Shan near Lake Chatyr-Kul at ca. 3,350 m, represents the alpine form. As is evident from the synonymy, specimens of the subalpine form from Dzungarian Ala Tau, collected by Karelin and Kirilov at the sources of the Sarkan River, were somewhat dubiously determined by the collectors themselves, as well as by Ledebour, Krylov, Kozo-Polyanskii and O. and B. Fedchenko, as *B. triradiatum* (Karelin, Kirilov and Kozo-Polyanskii). This is in spite of the fact that the differences between these



PLATE XXI. 1 — *Bupleurum tianschanicum* Freyn.; 2 — *B. scorzonnerifolium* Willd.; 3 — *B. exaltatum* M.B.; 4 — *B. longiradiatum* Turcz.

specimens and the latter species are very striking. These are evident in our Plate XX. Figure 5 shows the typical *B. triradiatum* Adams, after a specimen marked: "Western Sayans, 1931, No. 339, M. M. Il'in"; Figure 6 shows the subalpine form *B. densiflorum* Rupr., after a specimen marked: "Dzungarian Ala Tau, 1841, No. 1513, Karelin and Kirilov." But for habit we failed to observe any differences between the two forms of *B. densiflorum* Rupr. mentioned above.

07 The distinction does not appear to have any geographical significance, as numerous transitions occur. A separate species — *B. kokanicum* Rgl. et Schmalh. — of which the few available specimens show a unique habit, distinguished by a more robust and multicapital rhizome, spreading-ascending stems and a more glaucous than usual color of the entire plant, was at one time described from the northern part of Pamir-Alai (Dzhiptyk pass in Alai Range). According to the collectors' report this form grows on taluses in the alpine zone (3,000–4,000 m), which could provide the background to the peculiar habitat. More material and more observations in nature may warrant for *B. kokanicum* Rgl. et Schmalh. the race of specific status growing in the Alai-Turkestan section of the distribution area of *B. densiflorum* Rupr. (without the eastern part), as accepted in the present treatment. Evidently *B. densiflorum* has not been collected in Pamir-Alai south of the Trans Alai Range. The immature specimen, collected by O. and B. Fedchenko at the upper reaches of the Alichur River in southern Pamir ("from Karasu to Chatyrtash, 16 VII 1901") and determined as *B. kokanicum* Rgl. et Schmalh. (O. Fedch. in Tr. Bot. Sada, XXI, 3 (1903, 336 (Fl. Pamira, No. 193)), either belongs to a new species (as noted on the herbarium sheet by B. Fedchenko) or quite possibly to *B. aitchisonii* (Boiss.) Wolff, described from the alpine belt of Sefid-Koh Range, at the border between India and NE Afghanistan. Kozo-Polyanskii (ibid. (1914) 228) regarded his *B. falcatum* ssp. *persicum* which he called *B. densiflorum* Rupr. as very closely related to *B. falcatum* ssp. *aitchisonii*. We can hardly agree with this. *B. densiflorum* Rupr. is a xerophyllous Central Asian race of the Altai-Baikal *B. triradiatum* Adams, and has no direct relation to the cycle of *B. falcatum* L. On the other hand, *B. aitchisonii* (Boiss.) Wolff may very well be related to the latter group (see, for example, the color of the petals!).

14. *B. nordmannianum* Ldb. Fl. Ross. II (1844) 265; Grossg., Fl. Kavk. III, 150 and Opred. rast. Kavk. 224. — *B. falcatum* ssp. *persicum* var. α *nordmannianum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 226. — *B. falcatum* ssp. *exaltatum* var. α *persicum* Wolff. in Pflanzenr. IV, 228 (1910) 139. — *B. baldense* γ *oeneum* Boiss. Fl. or. II (1872) 849, an p.p. quoad syn. Ldb. — *B. polyphyllum* var. *exiguum* K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII (1912) 15. — *B. polyphyllum* K.-Pol., ibid., 1912, 110 (in observ.), non Ldb. — *B. vvedenskyi* Manden. in Izv. AN Arm. SSR, 1 (1945) 69.

Perennial; stems single or few, suberect, slightly branching, 15–25(40) cm high; radical leaves linear to narrowly lanceolate, with more or less

308 developed petioles, usually distinctly expanded at base, often more or less falcately curved, 5–7–(9-) nerved, 5–10 cm long, 0.4–0.8 mm wide; cauline leaves sessile, shorter and wider, sometimes to nearly ovate, often strongly expanding and subamplexicaul, long-attenuate-acuminate, sometimes more or less falcately curved, to 6–8 cm long, 1 cm wide (at base). Umbels few, rather long-pedunculate, of 6–9(13) thin, arcuately curved, unequal rays (0.5)1.5–2.5(3.5) cm long; involucre of (1)3–5 lanceolate or ovate, very unequal, acuminate leaflets 0.2–1 cm long, 1–3 mm wide; involucels of 6–8 broadly lanceolate or obovate, acuminate, herbaceous-scarious, greenish leaflets, with 3–5 branching nerves, 2.5–3 mm long, 1.5–2 mm wide, as long as or slightly longer than umbellets; flowers 15–20 per umbellet, pedicels ca. 2 mm long; petals golden yellow (or orange?); stylopodium dark yellow; fruit (unripe) oblong, with prominent ribs; oil tubes 3 in valliculae. Fl. July–August, Fr. August–September.

High mountain meadows and stony slopes. — Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: Arm.-Kurd. (?). Described from "Guria." Type and isotype in Leningrad.

Note. This is the only known species of the *B. ranunculoides* cycle L. from the Caucasus, originally determined (in herb.) by Ledebour. In her description of *B. vvedenskyi* Mandenova (l.c.) compares it with *B. rischavii* Alb., from which it is very well distinguished. Yet I was unable to discover any characters distinguishing *B. vvedenskyi* Manden. from *B. nordmannianum* Ldb.

15. *B. sibiricum* Vest in Schult. Syst. veg. VI (1820) 368; K.-Pol. in Tr. Bot. Sada, XXX (1914) 206 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 22. — *B. multinerve* β *angustius* DC. Prodr. IV (1830) 130. — *B. multinerve* Ldb. Fl. Ross. II (1844) 264, p.p. min. — *B. multinerve* Wolff in Pflanzenr. IV, 228 (1910) 119, p.p. quoad syn. Vest. — *B. falcatum* Ldb. l.c. 226, p.p. quoad pl. Turcz. — *B. flexuosum* Ldb. l.c. 267; Mandenova in Bot. zhurn. SSSR, XXII, 5 (1937) 451 (in Note to *B. sosnovskyi* Manden.) p.p. quoad specim. typicum Ldb. — *B. dahuricum* F. et M. ex Turcz. in Bull. Soc. Nat. Mosc. XVII, 4 (1844) 720 (Fl. baic.-dah. No. 508); Wolff, l.c. 140; Kom., Fl. Man'chzh. III, 1, 141. — *B. latifolium* Freyn in Oesterr. Bot. Zeitschr. XLV (1895) 318. — Ic.: K.-Pol., ibid. (1914) tabl. 5, fig. 6 and (1915) fig. 10. — Exs.: G. R. F. No. 2521; Karo, Pl. dahur. No. 380 (sub *B. latifolium*).

309 Perennial; stems few (2–6), rarely single, 25–50(70) cm high, ascending from more or less tufted base, erect or slightly flexuose above, simple or with few short simple branches in upper part; radical leaves usually rather numerous, linear-lanceolate or linear, gradually tapering to rather long petiole, acuminate, with (5)7–9(13?) nerves, 12–25 cm long, (0.4)0.7–1.5(2) cm wide; lower cauline leaves similar to the radical; median and upper leaves sessile, much shorter, ovate-lanceolate or lanceolate, slightly tapering at base, more or less rounded or semi-amplexicaul, not auricled, widest in lower third, gradually narrowing above, rather long-acuminate, with numerous (to 25) thin approximate nerves; uppermost leaves and

leaves on branches quite small, 1.5–2 cm long, ca. 5 mm wide, sometimes yellowish. Umbels rather small, the lateral umbels on branches distinctly smaller than the axial, axial umbels of (6)10–15(25) arcuately curved, more or less equal or unequal rays 1.5–3(5) cm long; involucre of 1–2(4) unequal leaflets, similar to the upper but usually much smaller, often obsolete or deciduous; involucels of 5(7)–12 elliptic or oblong-lanceolate, thinly acuminate, scarious, greenish-yellow leaflets with (3)5–7 nerves 5–6 mm long, much exceeding umbellets, rarely equal, flowers 10–20 per umbellet, on 2–3 mm pedicels; petals pale yellow; stylopodium brown-(greenish?) yellow, sometimes violet at flowering; fruit ovoid-ellipsoid, dark brown, ca. 3–4 mm long, with 4 longitudinal furrows in valleculae and more or less winged, pale, acute, ribs; oil tubes 3 in valleculae, 4–6 at commissure. Fl. July–August, Fr. August–September.

Dry meadows, steppes, shrubs along edges of broadleaved and pine forests and in clearings. — E. Siberia: Lena-Kol. (basin of Aldan River), Ang.-Say. (Baikal area), Dau. (often). Gen. distr.: Mong. (adjacent to Transbaikalia), Jap.-Ch. (Manchuria and Peking area). Described from Siberia. Type in Berlin.

Note 1. Kozo-Polyanskii (ibid. 1914) did not accept *B. flexuosum* Ldb. as a full synonym of *B. sibiricum* Vest., apparently because he was not aware of the type specimen *B. flexuosum* Ldb. ("Herb. Ledebour. *Bupleurum flexuosum* mihi. Mis. Frisch. No. 457. Hort. Dorp. 32, Sub. No. 3308") preserved at the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR. This certainly belongs to *B. sibiricum* Vest., as already noted by Mandenova (ibid.). Thus Ledebour was not confusing his *B. flexuosum* with the Altai plant noted by him, as suggested by Kozo-Polyanskii (ibid. 1914, 122). This plant remained undescribed until years later, when it was published as *B. falcatum* ssp. *flexuosum* K.-Pol. (ibid., 1914, 221) and subsequently promoted to *B. krylovianum* Schischk. (see also Note

310 Note 2. The synonymy shows that this species has variously been referred to the cycle of *B. ranunculoides* s.l. as well as to the cycle of *B. falcatum* s.l. (under different names, of course), two very sharply distinguished and independent groups, obviously because of some intermediate characters of *B. sibiricum* Vest. This species may in fact be the product of natural hybridization between species of the cycle of *B. ranunculoides* s.l. (such as *B. multinerve* DC.) and species of the cycle of *B. falcatum* s.l. (of the type *B. scorzonrifolium* Willd.?). *B. sibiricum* Vest. is most frequent in Transbaikalia, with its dry climate, where *B. multinerve* DC. is nearly absent. The latter is mainly linked to the more moist sections of the Baikal area and the Altai-Sayans mountain country. *B. sibiricum* Vest. growing in the basin of the Aldan River appears to represent an enclave outside its main distribution area.

Subsection 3. AGROPLEURUM Lincz. — Leaflets of involucels small, usually lanceolate, rarely ovate-lanceolate, not colored (green); cauline

leaves tapering, not amplexicaul, rarely tapering or slightly expanding to become partly amplexicaul.

16. *B. falcatum* L. Sp. pl. ed. 1 (1753) 232; DC. Prodr. IV, 132; Ldb. Fl. Ross. II, 266, p. p.; Stev. in Bull. Soc. Nat. Mosc. XXIX, 3, 342; Boiss. Fl. or. II, 850, p. p.; Shmal'g., Fl. I, 390; Fedch. and Fler., Fl. 684.— *B. falcatum* ssp. *eufalcatum* var. β . *rossicum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 210 ("B. falcatum auct. fl. Ross. europ. sensu strictissimo").— *B. rossicum* Woron. in Tr. Bot. Sada AN SSSR, XLIII, 2 (1931) 781 (Fl. Yugo-Vost. V); Maevskii, Fl. izd. 7, 544.— *B. falcatum* ssp. *eufalcatum* var. α . *occidentale* K.-Pol., ibid., 210 ("B. falcatum auctorum florae Europae occidentalis").— *B. occidentale* Manden. in Izv. AN Arm. SSR, 1 (1945) 70.— *B. falcatum* ssp. *eufalcatum* var. *genuinum* Wolff in Pflanzenr. IV, 228, 129 (? et var. *scorzonerifolium* Wolff, l. c. 132, p. p. quoad pl. nonn. Ross. europ.).— *B. falcatum* ssp. *diversifolium* K.-Pol., ibid., 212.— Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 44, f. 2; Wolff, l. c. tab. 16, f. F; Fedch. and Fler., ibid., fig. 559.— Exs.: G.R.F. No. 2522; Fl. exs. Reip. Bohem. Slov. Nos. 1077, 1078, 1079.

311 Perennial; stems usually many, 20–80 cm high, erect or more or less flexuose, often branching from base; radical leaves much larger and wider than the median and upper cauline leaves, ovate-elliptic or broadly obovate, often slightly falcately curved, to subrounded, 10–15 cm long (with petiole) and 1.5–2 cm wide petioles rather long; lower cauline leaves similar to the radical, slightly smaller; median and upper cauline leaves much smaller than the lower, linear to lanceolate, short-petiolate or sessile, short-acuminate or obtuse, 2–5(7) cm long, 0.3–0.5 cm wide. Umbels usually few, on rather short peduncles, of 5–7 unequal rays ca. 1–2 cm long; involucre of 3–5 lanceolate leaflets; involucels of 5–6 linear or linear-lanceolate, thinly acuminate leaflets, ca. 2.5–3 mm long, 1 mm wide, slightly longer than or as long as flowering umbellets; flowers 10–15 per umbellet, on ca. 1 mm pedicels; petals pale yellow; stylopodium dark yellow; fruit oblong, 3–3.5 mm long, with narrowly winged ribs; oil tubes 3 in valliculae. Fl. July, Fr. August.

Slopes, especially calcareous, shrubs, rarely in forests.— European part: V.-Kama?, U. Dnp., M. Dnp., V.-Don, Transv., Bes., Bl., Crim., L. Don; Caucasus: Cisc. **Gen. distr.:** Centr. Eur., Bal.-As. Min. (NW, European part). Described from Centr. Europe. Type in London.

Note. The distribution of the "original" *B. falcatum* L. in the USSR is not known with clarity. Kozo-Polyanskii (l. c. 1914) referred to this point when he queried "is there in European Russia a plant quite identical with the West European type, or is there not?" (p. 233). Even so, he tentatively separated (p. 210) two varieties — var. *occidentale* K.-Pol. and var. *rossicum* K.-Pol.— belonging to Wolff's *B. falcatum* ssp. *eufalcatum* Wolff, which he accepted. At the same time he pointed out that he had not seen the former variety on "Russian" territory.

Without going into the matter in detail, Voronov (l. c. 1931) promoted the var. *rossicum* K.-Pol. to the rank of species with var. *macrolema* Woron. as one of its forms, with long-acuminate involucel leaflets twice as

long as the umbellets or longer. *B. rossicum* (K.-Pol.) Woron, became widely used, although owing to the brevity of the diagnosis its circumscription remained vague.

Mandenova (l. c. 1945) reported the original *B. falcatum* L. for the northern Caucasus, adding that "A comparison of these specimens with those of Hungary, regarded as the locus classicus of subspecies *eufalcatum*, convinced us that the species growing in the USSR is identical with the European *B. falcatum* L. s. str." Even so, she proposes a new name — *B. occidentale* (K.-Pol.) Manden., As she claimed that the Caucasian plant was not distinguishable from *B. falcatum* L., as established by her, only the Caucasian plant should be accepted as the true *B. falcatum* L. The large amount of very varied material of "*B. falcatum* L." in my possession included rather broad-leaved forms, indistinguishable from "*B. occidentale*", as well as narrow-leaved forms, indistinguishable from the extreme forms of "*B. rossicum*." The settlement of this question obviously requires monographic investigation of the entire cycle of "*B. falcatum* L.", with emphasis on the Linnaean type material.

17. *B. polyphyllum* Ldb. in Mém. Acad. Sc. Pétersb. V (1815) 528; DC. Prodr. IV, 134; Ldb. Fl. Ross. II, 267; Boiss. Fl. or. II, 851; K.-Pol. in Tr. Yur'evsk. Bot. Sada, XIII, 2, 109; Grossg., Fl. Kavk. III, 151 and Opred. rast. Kavk. III, 224. — *B. falcatum* ssp. *polyphyllum* Wolff. in Pflanzenr. IV, 228 (1910) 134; K.-Pol. in Tr. Bot. Sada, XXX, 222. — *B. falcatum* M. B. Fl. taur.-cauc. I (1808) 203, p. p. quoad pl. cauc. — *B. falcatum* Ldb. l. c. 266, p. p. quoad pl. cauc. nonn. — *B. falcatum* Boiss. l. c. 850, p. p. quoad pl. cauc. M. B. sec. K.-Pol., ibid. (1914) 232. — *B. falcatum* var. *latifolia* Trautv. in Bull. Soc. Nat. Mosc. XXXIX (1866) 319, p. p. — *B. nervosum* Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 97 (Aufz. Pfl. Reise Transkauk. u. Pers.). — *B. oroboides* Sosn. in Zametkakh po sist. i geogr. rast. Tbilissk. bot. inst. Gruz, filiala AN SSSR, 2 (1938) 4. — Ic.: Wolff, l. c. tab. 16, f. A. — Exs.: Pl. or exs. No. 342.

Perennial; stems 50–100 cm high, single or few (to 4–6), ascending or erect, upright, simple or with short branches in upper part, rarely from base, rather densely leafy; radical leaves distinctly smaller and narrower than median cauline leaves, from lanceolate or oblanceolate (narrowly spatulate) to linear-lanceolate or linear, with petioles to 8–12 cm long, 0.6–1 cm wide, petioles rather long; lower cauline leaves similar to the radical, distinctly wider, petioles shorter or leaves sessile; median cauline leaves much larger than the lower leaves, broadly oblong-lanceolate, sometimes almost broadly linear, sessile, tapering or very slightly tapering at base, distinctly amplexicaul, short-acuminate, rarely obtuse, 8–16 cm long, 1–1.5(2) cm wide; upper cauline leaves rapidly decreasing in size, oblong-ovate or broadly lanceolate, often long-attenuate-acuminate. Umbels rather numerous but sometimes nearly solitary at tips of stems and branches, usually on rather short stalks, of (3)8–12 unequal rays (1)1.5–2.5(3) cm long; involucre of 1–5 lanceolate, long-acuminate, readily deciduous leaflets; involucels of 6–12, rarely 5, linear-lanceolate leaflets

313 long-acuminate ca. 2.5–3.5 mm long, 1 mm wide, slightly longer or nearly as long as flowering umbellets; flowers 10–15 in umbellet, on ca. 1.5 mm pedicels; petals pale yellow; stylopodium dark yellow; fruit usually oblong-ovoid, 4–5 mm long, with rather broadly winged ribs; oil tubes 3(–5?) in valleculae. Fl. July–August, Fr. August–September.

Mountain forests and subalpine meadows. – Caucasus: everywhere.

Gen. distr.: Arm.-Kurd. (?), Iran. (northwestern part). Described from "Caucasus." Type in Leningrad.

18. *B. polymorphum* Alb. in Tr. Tifl. Bot. sada, I (1895) 101 (Prodr. fl. colch.). – *B. falcatum* ssp. *exaltatum* var. *polymorphum* Wolff. in Pflanzenr. IV, 228, (1910) 138. – ? *B. polyphyllum* β . *stenophyllum* Boiss. Fl. or. II (1872) 851. – *B. polyphyllum* var. γ . *stenophyllum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 223; Grossg., Fl. Kavk. III, 151. – *B. exaltatum* Ldb. Fl. Ross. II, 226, p. p. – ? *B. falcatum* ssp. *eufalcatum* var. *scorzonerifolium* Wolff, l. c. 132, p. p. quoad pl. cauc. – *B. polyphyllum* K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2 (1912) 110 (in observ.) p. p. et auct. fl. cauc. nonn. – Exs.: G. R. F. No. 3227.

Perennial; stems 80–100 cm high, usually many (3–6) [sic], erect, distinctly flexuose, simple or with short branches in upper part, rather densely leafy; radical leaves linear-spatulate, to 8–12 cm long, 0.5–0.7 cm wide, on rather long petioles; lower and median cauline leaves narrowly linear-lanceolate or linear, sessile, very slightly tapering at base or (the uppermost) slightly expanding and amplexicaul, more or less long-acuminate, to 10–15(24) cm long. 0.5–0.8(1) cm wide; upper cauline leaves noticeably shorter, distinctly expanding at base and amplexicaul, above long-caudate-acuminate. Umbels rather numerous, on rather short stalks, of 4–9(11) unequal rays 0.5–1.5 cm long; involucre of 1–5 linear-lanceolate, acuminate leaflets; involucels of 5–6 lanceolate or broadly lanceolate, more or less long-acuminate leaflets ca. 3–5(7) mm long, 1 mm wide, definitely exceeding umbellets or (rarely) equal; flowers 8–15 per umbellet, on ca. 1.5–2 mm pedicels; petals pale yellow; stylopodium dark yellow; fruit oblong-ellipsoid, ca. 4 mm long, with narrowly winged ribs; oil tubes 3–5 in valleculae. Fl. July–August, Fr. August–September.

Mountain slopes. – Caucasus: everywhere. Endemic. Described from Abkhazia. Type in Geneva, paratype in Leningrad and Geneva (?).

Note. This species, from the cycle of *B. polyphyllum* Ldb., is very close to its narrow-leaved forms. In habit it is very similar to *B. diversifolium* Roch. described from Banat, from which it is readily

314 distinguishable by the number of oil tubes in the valleculae (3–5) as against 1.

19. *B. sosnovskyi* Manden. in Bot. Zhurn. SSSR, XXII, 5 (1937) 451 ("Sosnovskyi"); Grossg., Opred. rast. Kavk. (1949) 224. – *B. falcatum* var. *oblongifolia* Trautv. in Bull. Soc. Nat. Mosc. XXXIX (1866) 319, p. p. quoad pl. cauc. nonn. – Ic.: Manden., ibid., fig. 1.

Perennial; stems 50–100 cm high, single or to 10–12, more or less angled-flexuose, usually branching (sometimes repeatedly) in upper part; leaves, like stems, more or less glaucescent, stiff, with 5–7 longitudinal nerves sharply prominent beneath, loosely interconnected, faintly and

irregularly netted; radical leaves not known; lower cauline leaves sessile, linear-lanceolate, gradually tapering at both ends, rather long-acuminate and mucronate, 6–10 cm long, (0.3)0.5–0.8 cm wide, widest in upper third or at middle; median and upper leaves of similar shape, gradually diminishing in size, sometimes slightly falcately curved; uppermost leaves and leaves on branches sharply diminishing in size, to 0.5–1 cm long, 1–2 mm wide. Umbels rather numerous, rather large, sometimes forming loose spreading-paniculate inflorescence (lateral umbels much smaller than the axial); axial umbels of 11–18 more or less equal, suberect or strongly arcuately curved, thin, 2–3 cm long rays; involucre of 5–8 large, sharply recurved, unequal, linear-lanceolate, acute leaflets (0.5)1–2 cm long, 1–2(3) mm wide; involucels of 4–5 more or less recurved, lanceolate or nearly ovate-lanceolate, strongly acuminate leaflets with (3)5 nerves, (2)4–7 mm long, 1–2 mm wide, distinctly exceeding flowering umbellets or as long, rarely slightly shorter; flowers (5)10–15 per umbellet, on ca. 2 mm pedicels; petals golden yellow; stylopodium greenish-yellow(?); fruit oblong, with narrowly winged ribs; oil tubes 1 in valliculae, 2 at commissure. Fl. July–August, Fr. August–September.

"Light forest clearings"-(Mandenova, *ibid.*). – Caucasus: (?) Cisc., S. Transc. (near Akhaltsikhe and Lake Sevan). Endemic(?). Described from near Akhaltsikhe (Uravel'-Su River valley). Type in Leningrad, paratype in Tbilisi and Leningrad.

Note. This is a curious species, closely similar to the Altai-Tien Shan *B. krylovianum* Schischk. in a number of characters (particularly in involucre and involucels). This led Trautfetter (l. c.) to refer both to his *B. falcatum* var. *oblongifolia*, yet it is well differentiated from the latter by the smaller cauline leaves.

- 315 20. *B. krylovianum* Schischk. ex Kryl., Fl. Zap. Sib. VIII (1935) 2010. – *B. falcatum* Ldb. Fl. alt. I (1829) 349; Ldb. Fl. Ross. II, 1, 266, p. p. quoad pl. altaica; Kryl., Fl. Alt. II, 508. – *B. falcatum* var. *oblongifolia* Trautv. in Bull. Soc. Nat. Mosc. XXXIX (1866) 319, p. p. excl. syn. M. B.; O. and B. Fedch., Perech. rast. Turk. 3, 90. – *B. oblongifolium* Kryl., Fl. Zap. Sib. VIII (1935) 2010, p. syn. ined.; non Ball. (1878). – *B. falcatum* ssp. *flexuosum* K.-Pol. in Tr. Bot. Sada, XX (1914) 221 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 27. – *B. flexuosum* Mandenova in Bot. zhurn. SSSR, XXII, 5 (1937) 451 (in Note to *B. sosnovskyi* Manden.) p. p.; non Ldb. – *B. flexuosum* M. Popov in Tr. Almaat. zapovedn. III (1940) 34, non Ldb. – Ic.: K.-Pol., *ibid.* (1914) fig. 7 and (1915) fig. 11 (sub *B. falcatum* ssp. *flexuosum*).

Perennial; stems, 30–70(100) cm high, usually few (2–8), ascending from more or less thick, woody, branching, multicapital base, robust, erect, distinctly flexuose in upper part, often rather long and repeatedly branching, leaves (like stems) more or less bright green or slightly glaucescent, stiff, with 5–7 longitudinal nerves sharply prominent beneath, loosely interconnected, faintly and irregularly netted; radical and lower cauline leaves gradually tapering at base to rather long petioles, rather broadly lanceolate (sometimes oblanceolate), more or less gradually acuminate, (with petiole), to 10–20 cm long, 0.5–1.5 cm wide; median cauline leaves generally much wider than the lower, sessile, broadly to more or less narrowly

lanceolate (sometimes nearly linear-lanceolate), gradually tapering at both ends, more or less long-acuminate, often slightly falcately curved, (6)8–15 cm long, (0.5)1–2(3) cm wide, widest in upper third or at middle; upper leaves slightly smaller; uppermost leaves in branching part of stem sharply diminishing in size, lanceolate to linear, rather short-acuminate, (0.5)1–3(6) cm long, (1)2–4(6) mm wide. Umbels often numerous, rather long-pedunculate, rather large, the lateral usually much smaller than the axial but all developed, often forming a loose, broadly spreading-paniculate inflorescence; axial umbels of 10–15(25) slightly (sometimes rather sharply) unequal, slightly curved, thin, often rather broadly divergent 2–3.5 cm long rays; involucre of 4–6(8) recurved, usually sharply unequal, lanceolate, acute, sometimes yellowish-green leaflets (0.2)0.5–1(2) cm long, 1–3 mm wide; involucels of 5–7(9) more or less recurved, oblong-ovate, or lanceolate, shortly and narrowly acuminate, sometimes yellowish-green leaflets with 3 nerves, (2)4–7 mm long, 1–2 mm wide, leaflets about as long as flowering or fruiting umbellets, rarely half as long; flowers (5)10–15(25) per umbellet, on 2–2.5 mm pedicels; petals pale yellow; stylopodium yellow; fruit oblong-ellipsoid, brown, shiny, 2.5–3.5(4) mm long, with shallow, subfiliform, acute ribs; oil tubes 1 in valleculae (rarely 2 or 3). Fl. July–August, Fr. (August) September.

Steppe meadows in thickets of steppe shrubs, stony and fine earth mountain slopes, in thinned out woody-shrubby thickets (Dzungarian and Zailiiski Ala-Tau). – W. Siberia: Irt. (SE), Alt. (southern part); Centr. Asia: Dzu.-Tarb., T. Sh. (northeastern part – Zailiiski Ala-Tau Range and eastern part of Kirghiz Ala-Tau). Described from Tarbagatai. Type in Leningrad.

Note 1. We adopt as type specimens those collected by A. Schrenk, 25 August 1841, on Tarbagatai Range near the Sai-Asu mountain pass, the same locality from which Trautfetter (l. c.) established *B. falcatum* var. *oblongifolium* Trautv.

Note 2. *B. flexuosum* Ldb. was included by Kozo-Polyanskii (ibid., 1914, 1915) in the synonymy of *B. krylovianum* Schischk. (*B. falcatum* ssp. *flexuosum* K.-Pol.), though it bears no relation to that species. The specimen cited by Kozo-Polyanskii (ibid., 1914, 222) as "Specimen Ledebourianum originale ("cult." 5. VIII. fr)" bears two labels, written by Ledebour, reading "1003. 5 Aug. Bupl. no. sp. Sogra. Cit," and "223. Herb. Ledebour. Bupl.? falc. Valleculae 1–3 vittatae..."

This specimen certainly represents *B. krylovianum* Schischk. It was apparently grown from seeds collected in southern Altai, as indicated by the label of another specimen, labeled by Meyer: "223. Altai. *Bupleurum falcatum* L. ... Prope Sogra, ad fluv. Irtysch" ... Ledebour obviously intended to describe the Altai plant as a separate new species and there is nothing to show that he did not separate it from his Dauria *B. flexuosum*. It suffices to note his comment on the label of the first of the specimens mentioned – "Valleculae 1–3 vittatae..." H. E. Petersen's classification of this specimen as *B. flexuosum* Ldb. is erroneous (H. E. Petersen, 1900–1905?). The type of *B. flexuosum* Ldb. is another completely reliable specimen which fully corresponds to Ledebour's description (l. c. 1844, 267), and belongs to *B. sibiricum* Vest (see Note to that species). Lastly, *B. flexuosum* Ldb. is invalid since it is a later homonym.

Note 3. Krylov (ibid. 1935) presents a specific form (f. intermedium Kryl.) with narrow (2–5 mm wide) linear-lanceolate leaves as appearing "to be an intermediate form between this species and *B. scorzonnerifolium*."

21. *B. czimganicum* Lincz. sp. nova in Addenda XV, 429.

317 Perennial; stems 50–100 cm high, usually few (2–10), ascending from rather powerful woody, branching-multicipital base, large, erect, rather short-branching in upper part, sometimes hardly flexuose, leaves (like stems) glaucous-green, stiff, 5–7 longitudinal nerves sharply protruding at lower side, loosely united, faintly and irregularly reticular; radical gradually attenuate at base in rather long petiole, from rather short, broadly oblanceolate, nearly spatulate, apically rounded or obtuse, 6–9 cm long (with petiole), ca. 1 cm wide to more or less long, oblong-lanceolate or linear, gradually acuminate at apex, to 16–18 cm long, 0.5–1 cm wide; lower cauline leaves on shorter petioles than the radical, lanceolate or narrowly (nearly linear) lanceolate, gradually acuminate at apex, 10–15 cm long, 0.5–0.8 cm wide; median and upper cauline leaves generally much narrower than the lower, sessile, lanceolate or linear-lanceolate, gradually acuminate at apex, widest in upper third or at middle, 3–7 cm long, 0.3–0.6 cm wide, rapidly diminishing at apex; uppermost leaves (in branching part of stem) small, nearly inconspicuous, from linear to linear-subulate, long-acuminate, 0.5–1.5(2.5) cm long, 1–2 mm wide. Umbels numerous, short-pedunculate, forming loose more or less narrowly paniculate nearly leafless inflorescence, comparatively small (lateral much smaller than axial, lateral on branches usually undeveloped, few-rayed, subsessile), axial with 8–10(12), sometimes unequal, slightly curved, rather thin and more or less broadly divergent rays (0.5)1–1.5(2) cm long; involucre of 4–6 unequal, stiff, lanceolate, acuminate leaflets, 2–3 mm long, appressed to rays; involuclers of 5 unequal, stiff, thick, broadly lanceolate or nearly ovate, acuminate leaflets appressed to umbellets, 3-nerved, 1.5–2 mm long, ca. 1 mm wide, much (nearly half) shorter than fruiting umbellets; flowers (5)10–15 in umbellet, on short, 1–1.5 mm long pedicels; petals light yellow; stylopodium brown (?); fruit oblong-ellipsoid, light brown, shiny, ca. 4 mm long, with 4 longitudinal furrows in vallecule and filiform obtuse pale ribs; oil tubes 3 in vallecule. Fl. July–August, Fr. August–September.

Bare red clays in woody-shrubby belt (1,500–1,800 m). — Centr. Asia: T. Sh. (Chirchik River basin — Chimgan, natural boundary, Kirghiz Ala-Tau Range, northern slope). Endemic. Described from Chimgan. Type in Leningrad.

318 Note. This species is related to *B. krylovianum* Schischk., but is easily distinguished from it by its generally more xeromorphous habit: much narrower leaves, fewer-leaved stems, distinct, nearly leafless, narrowly paniculate inflorescence, glaucous-green color, smaller axial umbels, more numerous, undeveloped lateral umbels, smaller leaflets of involuclers and involuclers appressed to rays and not recurved, as well as other characters. As yet, it is known from a single locality (Chimgan) in W. Tien Shan (collected by several authors) and from one locality on the northern slope of Kirghiz Ala-Tau Range (Solyanaya shchel', Tertiary clay, 19 VII 1930, Nikitina and Tarnovskii). A changed Pliocene relict(?).

22. *B. badachschanicum* Lincz. sp. nova in Addenda XV, 430.

Perennial; stems thin, to 40(60?) cm high, apparently many, ascending from multicapital base, in lower part curved-ascending, straight above, more or less sharply angular-flexuose, the upper half more or less long-sparse branching; leaves (like stems) glaucescent-green, more or less stiff, with 5 longitudinal, loosely interconnected, irregularly netted nerves, sharply prominent beneath; lower cauline leaves gradually tapering to rather long petioles, lanceolate or linear-lanceolate, gradually acuminate, thinly mucronate, with petiole 6–8 cm long, 0.5–0.8 cm wide, widest in upper third or at middle; median cauline leaves of similar shape and size to the lower leaves (slightly diminishing in size upwards) but on shorter petioles or sessile; uppermost leaves and leaves on branches sessile, much smaller and narrower, linear, (0.5)1–3 cm long, 1–2 mm wide. Umbels few, rather small, the lateral markedly smaller than the axial; axial umbels of 5–6 thin, sharply unequal, slightly curved, more or less appressed rays (0.3)1.5–2(2.5) cm long; involucre of 4–6 rather stiff, unequal, lanceolate or narrowly ovate, acuminate, 1–3 mm long leaflets appressed to rays; involucels of 5 thickish, unequal, broadly lanceolate or nearly ovate, 3-nerved, ca. 1 mm long, 0.5 mm wide, acuminate leaflets appressed to umbels, nearly half the length of the flowering umbels, about as long as fruiting umbel; flowers 10–15 per umbellet, on ca. 1 mm pedicels; petals pale yellow; stylopodium brown (?); fruit (unripe) oblong, ca. 2 mm long. Fl. (August) September, Fr. September (October).

Probably on stony taluses. — This species may well grow in Centr. Asia: Pam.-Al. (Darvaza-Pyandzh River valley). Described from NE Afghanistan (Badakhshan, Pyandzh River valley near Omar village, A. Regel', 1882). Type in Leningrad.

- 319 Note. A curious species about which not too much is known (the style collection lacks root and ripe fruits). It is related to the group of the (original) broadleaved *Arpopleurum* as yet known only from NE Tien Shan in Central Asia in the species *B. krylovianum* Schischk. and now replenished by *B. czimganicum* Lincz. (see previous species) and (probably) *B. badachschanicum* Lincz., which is very close to *B. czimganicum* (for example, in the structure of the involucre and involucels), but easily differentiated by the longer branches of the stem, few umbels (not forming inflorescence or a likeness thereof), and slightly different shape of the leaves.

23. *B. komarovianum* Lincz. nom. nov. — "*B. breviradiatum* Rgl." Kom. and Alis., *Opred. rast. Dal'nevost. kr.* (1932) 800, non Wettst. (1892). — "*B. longiradiatum* β . *breviradiatum* Rgl." Kom., *Fl. Man'chzh.* III, 1 (1905) 139, p. p.

Perennial; stems single or few (2–3), 50–100 cm high; nearly erect below, in upper part distinctly, sometimes rather sharply, angular-flexuose and branching (sometimes rather densely and repeatedly), leaves intensely green above, paler, glaucescent beneath; radical and lower cauline leaves lanceolate, oblanceolate, or narrowly elliptic, leaves in upper part 15–20(30) cm long (with petiole), 1.5–2.5(3.5) cm wide; more or less gradually acuminate or somewhat rounded, short-mucronate, gradually tapering to more or less long, flat,

rather wide petiole as long as blade or slightly shorter, with 7 rather sharp nerves; median cauline leaves generally much wider than the radical and lower cauline, sessile, broadly lanceolate or oblong-elliptic, gradually cuneately tapering below, gradually acuminate or rounded, more or less short-mucronate, 7-9-nerved, 8-15 cm long, (1.5)2.5-3.5(4) cm wide, widest at middle; upper cauline leaves slightly smaller, sometimes slightly falcately curved; uppermost leaves and leaves on branches still smaller, comparatively narrower, to 1-1.5 cm long, 0.4-0.6 cm wide. Umbels often rather numerous, forming loose, spreading-paniculate inflorescence, rather large - the lateral usually distinctly smaller than the axial; axial umbels of (7)9-13(15) thin, unequal or nearly equal, nearly always arcuately curved, 2-3.5(4) cm rays; involucre absent through abscission or of 1-6 unequal, more or less recurved, lanceolate or linear-lanceolate acute leaflets 3-7(10) mm long, 1-2 mm wide; involucels of 5-6 acute, more or less equal, lanceolate (rarely narrowly ovate-lanceolate), distinctly keeled, 3-nerved, 2-3(5) mm long, 0.5-1 mm wide leaflets appressed to umbels, about as long as flowering umbels; flowers 8-12(15) per umbellet, on ca. 2 mm pedicels; petals pale yellow; stylopodium brown (or greenish-yellow?); fruit short-ellipsoid, brown, ca. 3 mm long, with obtuse, short ribs; oil tubes Fl. July-August, Fr. September-October.

Oak forests, shrubby thickets, sandy riverbanks, cliffs. - Far East: Uss. (mainly southern part, north along the Botchi River valley, east on the slopes of the Sikhote-Alin Range). Gen. distr.: Jap.-Ch. (Manchuria-Kirin province, Mukden, Korea, Japan). Described from Manchuria (Kirin province). Type in Leningrad.

Note 1. This species belongs to the cycle of *B. falcatum* s. l., the East Asian species of which have been given very little study. It is certainly close to *B. octoradiatum* Bge. described from near Peking (? = *B. pekinense* Franch. ex Forb. et Hemsl., 1887) but apparently easily distinguished by the much larger leaves. A critical study of more material is indicated. *B. jeholense* Nakai, also from this group, has recently been described (in Journ. Jap. Bot. XIII (1937) 482) from Manchuria; we have not seen the material. Nor is the identity of *B. chinense* DC., described from China in 1830, totally clear. As noted above (see Note to *B. longiradiatum* Turcz.), *B. komarovianum* was for a long time incorrectly identified with *B. longiradiatum* var. *breviradiatum* F. Schmidt.

Note 2. Inasmuch as neither Komarov nor Alisova (ibid., 1932) mention a type, we have chosen one of the specimens cited by Komarov (ibid., 1905, 138, under *B. longiradiatum* var. *breviradiatum* Rgl.): "in oak forests along the Chuehrho River valley, a tributary of the Mutan Chiang River, near the town of O-mu-so, 30 VII 1896, Komarov." The following specimens are paratypes: "region of Pos'et Bay, 4(16) VIII, 1860, Maksimovich"; ibid., 29 IX 1929, Transhel; "basin of the Suchan River, 11 VII 1913, No. 611, Bulavkina; Khanka district, 25 VII 1928, No. 774, Grinevich" and others.

24. *B. scorzoneraefolium* Willd. Enum. Hort. Berol. (1809) 300 ("scorzoneraefolium"); DC. Prodr. IV, 132; Turcz. in Bull. Soc. Nat. Mosc. XVII, 4, 721 (Fl. baic.-dah. No. 509); Maxim. in Mém. Acad.

Sc. Pétersb. IX, 125 (Prim. fl. Amur. No. 319); Kom., Fl. Man'chzh. III, 1, 139; Kom. and Alis., Opred. rast. Dal'nevost. kr. 800; Kryl., Fl. Zap. Sib. VIII, 2009.— *B. falcatum* β . *scorzonerifolium* Ldb. Fl. Ross. II (1844) 267.— *B. falcatum* ssp. *eufalcatum* var. *scorzonerifolium* Wolff in Engl. Pflanzenr. IV, 228 (1910) 132, p. p. — *B. falcatum* ssp. *scorzonerifolium* K.-Pol. in Tr. Bot. Sada, XXX (1914) 219 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 27.—? *B. baldense* Ldb. Fl. alt. I (1828) 350, p. p. — *B. Kirillowi* Turcz. 321 ex K.-Pol., ibid. (1914) 219, nomen.—? *B. falcatum* Kom. and Alis., Opred. rast. Dal'nevost. kr. (1932) 800, p. p. — Exs.: G. R. F. No. 2523.

Perennial; stems 20–60(80) cm high, solitary or few (2–5), densely covered at base with fibrous remnants of leaf petioles, usually more or less angular-flexuose and rather strongly (often repeatedly) branching; leaves more or less similar, the radical and lower cauline leaves on narrow more or less long petioles, the others sessile, lanceolate or linear-lanceolate, gradually tapering at both ends, widest at middle, long-acuminate, 7–15 cm long, 2–6(8 rarely to 16) mm wide, with 5–7(9) prominent, longitudinal nerves alternating with thinner, less prominent nerves; uppermost leaves smaller. Umbels rather small, unequal (those on branches slightly smaller than the axial), rather numerous, sometimes forming a loose spreading-paniculate inflorescence, of 6–10(15) more or less thin, equal or unequal, more or less arcuately curved 1.5–3 cm rays; involucre deciduous more often of 1–3 (rarely to 5) unequal, linear leaflets, the longest 4–6 mm long, appressed to rays; involucels of 5–6 lanceolate or linear-lanceolate, thinly acuminate leaflets appressed to umbellets, 2.5–4 mm long, ca. 1 mm wide, 3-nerved, nearly equal to umbellets or slightly longer, rarely much longer than sterile umbellets; flowers 10–20 per umbellet, on 1.5–2 mm pedicels; petals pale yellow; stylopodium (greenish?)-yellow; fruit ovoid or oblong-ovoid, brown, 2–3 mm long, with short thick obtuse ribs and 4 longitudinal furrows in valleculae; oil tubes 3 in valleculae (rarely 2). Fl. July–August, Fr. August (September). (Plate XXI, Figure 2.)

Dry meadows, shrubs, edges and clearings of pine forests, steppe slopes, sometimes to subalpine belt. — W. Siberia: Alt. (rarely); E. Siberia: Ang.-Say., Dau. (often); Far East: Ze.-Bu., Uss., Sakh. Gen. distr.: Mong. (northern part), Jap.-Ch. (Manchuria, Korea, Japan). Described from cultivated specimens grown in the Berlin Botanical Garden from seeds apparently obtained from the vicinity of Lake Baikal. Type in Berlin, isotype in Leningrad.

Note 1. Our description of *B. scorzonerifolium* Willd. (Table XXI, Figure 2) is based on the isotype.

Note 2. Alongside the typical, rather narrow-leaved form in the eastern part of the distribution area of this species (from NE Dauria to the Maritime Territory) there also occur forms with wider leaves (to 1.5 cm) sometimes classified (e.g., Komarov and Alisova, ibid.) as 322 "*B. falcatum* L." — a species which (in its narrow, classical circumscription) does not grow in the Far East. Komarov and Alisova (ibid.) distinguish "*B. falcatum* L." from *B. scorzonerifolium* Willd. by "leaflets of the involucre numerous" in the former as against "leaflets of the involucre 1–2, narrow or absent" in the latter. They seem to have

ignored that the leaflets of the involucre of *B. scorzonrifolium* Willd. were rather readily deciduous and therefore varied widely in number, or that they were lacking at the time of observation. (We have observed involucre of 0 to 4–5 leaflets on one and the same specimen.) This form is very closely related to *B. octoradiatum* Bge. (? = *B. pekinense* Franch. ex Forb. et Hemsl, 1887) described from Peking in 1830, and may indeed be identical with it.

25. *B. bicaule* Helm. in Mém. Soc. Nat. Mosc. II (1809) 108; Kryl., Fl. Zap. Sib. VIII, 2008. — *B. falcatum* ssp. *exaltatum* var. *bicaule* Wolff in Engl. Pflanzenr. IV, 228 (1910) 140. — *B. falcatum* ssp. *bicaule* var. α . *verum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 217 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 25. — *B. baldense* β . *multicaule* Ldb. Fl. alt. I (1829) 350. — *B. exaltatum* Ldb. Fl. Ross. II (1844) 266, p. p.; Turcz. in Bull. Soc. Nat. Mosc. XVII, 4, 722 (Fl. baic.-dah. No. 510); Kryl., Fl. Alt. II, 507. — ? *B. angustifolium* Ldb. l. c. (1844) 265; Kryl., Fl. Zap. Sib. VIII, 2008. — *B. falcatum* ssp. *bicaule* var. β . *angustifolium* K.-Pol., ibid. (1914) 217, 1915, 26. — Ic.: Helm, l. c. tab. 8.

Perennial; stems mostly numerous (5–15), 15–35 cm high, ascending from more or less densely caespitose base, thin, more or less erect, often short-branching in upper part, sometimes rather strongly flexuose; all leaves linear, stiff, acute, 3–5-nerved, usually longitudinally folded or rolled but then subulate, rarely flat, slightly tapering to petiole, 5–12 cm long, 1–1.5(3) mm wide; cauline leaves semi-amplexicaul, much smaller. Umbels rather small, the lateral ones distinctly smaller than the axial; axial umbels of 5–7(13) more or less equal or unequal, thin, arcuately curved 1–4 cm rays; involucre of 1–7 small, unequal, lanceolate leaflets; involucels of 5(9–12) thickish, linear or elliptic, acuminate, green, herbaceous leaflets, 1–3-nerved, 1–3 mm long, shorter than, as long as, or slightly longer than umbellets; flowers 10–20 per umbellet, on ca. 1.5 mm pedicels; petals pale yellow; stylopodium brown-(greenish-?)yellow, after flowering (sometimes?) violet; fruit oblong-ovoid, glaucescent-brown, ca. 3 mm long, with 4 longitudinal furrows in valliculae and pale acute, more or less winged ribs; oil tubes 3 in valliculae. Fl. July–August, Fr. August–September.

Stony and pebbly slopes, open cliffs, rarely steppe meadows and in 23 steppes, mainly in foothill areas. — W. Siberia: Irt. (Altai area in the east), Alt.; E. Siberia: Ang.-Say. (southern part), Dau. (southern part).

Gen. distr.: Mong., Jap.-Ch.? (NW Manchuria). Described from S. Siberia (in the vicinity of Krasnoyarsk). Type in Leningrad (?).

Note. *B. angustifolium* Ldb., described from Altai (Charysh River valley) after a young, undeveloped specimen, seems to be a small form of *B. bicaule* Helm., apparently distinguished from it only by the lanceolate, thinly acuminate, membranous-margined leaflets of the involucels, twice as long as the undeveloped or flowering umbellets. It is hardly possible to recognize this apparently rare form as a species.

26. *B. pusillum* Kryl. in Tr. Bot. Sada, XXI (1908) 18; Kryl., Fl. Alt. II, 507; Wolff in Pflanzenr. IV, 228, 142; Kryl., Fl. Zap. Sib. VIII,

2009.— *B. falcatum* ssp. *bicaule* var. γ . *pusillum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 218 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 26.

Perennial; stems 2–10 cm high often more or less numerous (5–10), simple or slightly branching, usually slightly spreading or decumbent, rarely erect, with bundles of radical leaves forming small tufts; all leaves linear, stiff, long-acuminate, subulate, rolled lengthwise, 2–5 cm long, 1–2 mm wide, with 3 obscure nerves, like stem grayish-green. Umbels small, of 4–6 more or less equal or unequal, arcuately curved 1–1.5 cm rays; involucre of 1–4 unequal leaflets, the longer lanceolate, shorter than umbel rays; involucels of 5–7 ovate-lanceolate, acuminate, green, herbaceous ca. 2 mm long leaflets, about as long as umbels, 3-nerved; flowers 10–20 per umbellet, on ca. 1 mm pedicels; petals pale yellow, sometimes faintly pinkish; stylopodium greenish (?)–yellow, at end of flowering (sometimes?) violet; fruit ovate-ellipsoid, glaucescent-brown, ca. 2.5 cm long, with 4 longitudinal furrows in vallecule and acute, more or less winged, pale ribs; oil tubes 3 in vallecule. Fl. June–July, Fr. July–August.

Open slopes and desert-steppe valleys, steppes and desert-steppe groups on gravelly soils.— W. Siberia: Alt.; E. Siberia: Ang.-Say. (southern part), Dau. (?). Gen. distr.: Mong. Described from Altai (Chuya River basin, Chagan-Uzun River valley). Type in Tomsk, isotype in Leningrad.

Note. A small mountain-desert form very closely related to the preceding species. Kozo-Polyanskii (ibid. 1914.1915) ranked it as a variety.

- 324 27. *B. exaltatum* M. B. Tabl. prov. Casp. (1798) 113 et Besch. Länd. Casp. (1800) 156, p. p. quoad pl. cauc.; DC. Prodr. IV, 131; Ldb. Fl. Ross. II, 266; Grossg., Fl. Kavk. III, 150 and Opred. rast. Kavk. 224, an p. p.—? *B. falcatum* var. β . *exaltatum* Briq. Monogr. Bupl. Alp. Marit. (1897) 94, p. p.— *B. falcatum* ssp. *exaltatum* var. α . *euexaltatum* Wolff in Pflanzenr. IV, 228 (1910) 134; p. p.; K.-Pol. in Tr. Bot. Sada, XXX, 214 and in B. Fedch., Fl. Az. Ross. 10, 1, 25.— *B. baldense* M. B. Fl. taur.-cauc. I (1808) 203, III (1819) 196, p. p. quoad pl. cauc.; Boiss. Fl. or. II (1872) 848; Shmal'g., Fl. I, 390 et auct. fl. ross. nonn.; non Turra (1780), nec Host (1797).— *B. linearifolium* DC. Prodr. IV (1830) 131; Boiss. l. c. 849; O. and B. Fedch., Perech. rast. Turk. 3, 90 et auct. fl. As. Med. subomn.— *B. falcatum* var. *linearifolia* Trautv. in Bull. Soc. Nat. Mosc. XXXIX (1866) 319, p. p. quoad syn. M. B.— *B. falcatum* ssp. *exaltatum* var. β . *linearifolium* Wolff in Pflanzenr. IV, 228 (1910) 135; p. p.; K.-Pol. in Tr. Bot. Sada, XXX, 214 and in B. Fedch., Fl. Az. Ross. 10, 1, 25.— *B. Kotschyanum* Boiss. Diagn. ser. I, 10 (1849) 29; Nevskii in Tr. BIN AN SSSR, ser. I, 4 (1937) 271 (Florula Kuhitang. No. 131).— *B. linearifolium* β . *Kotschyanum* Boiss. l. c. 1872, 850.— *B. cuspidatum* Bge. in Mém. Acad. Sc. Pétersb. VI (1854) 299 (Pl. Lehm. No. 526).— Borshch., Mat. bot. geogr. Aralo-kasp. kraya (1865) 105.— Exs.: G. R. F. No. 1720 (sub *B. falcato*), No. 2524 (sub *B. linearifolio*); Bornm. Pl. turkest. No. 220 (sub *B. linearifolio* β . *Kotschyano*).

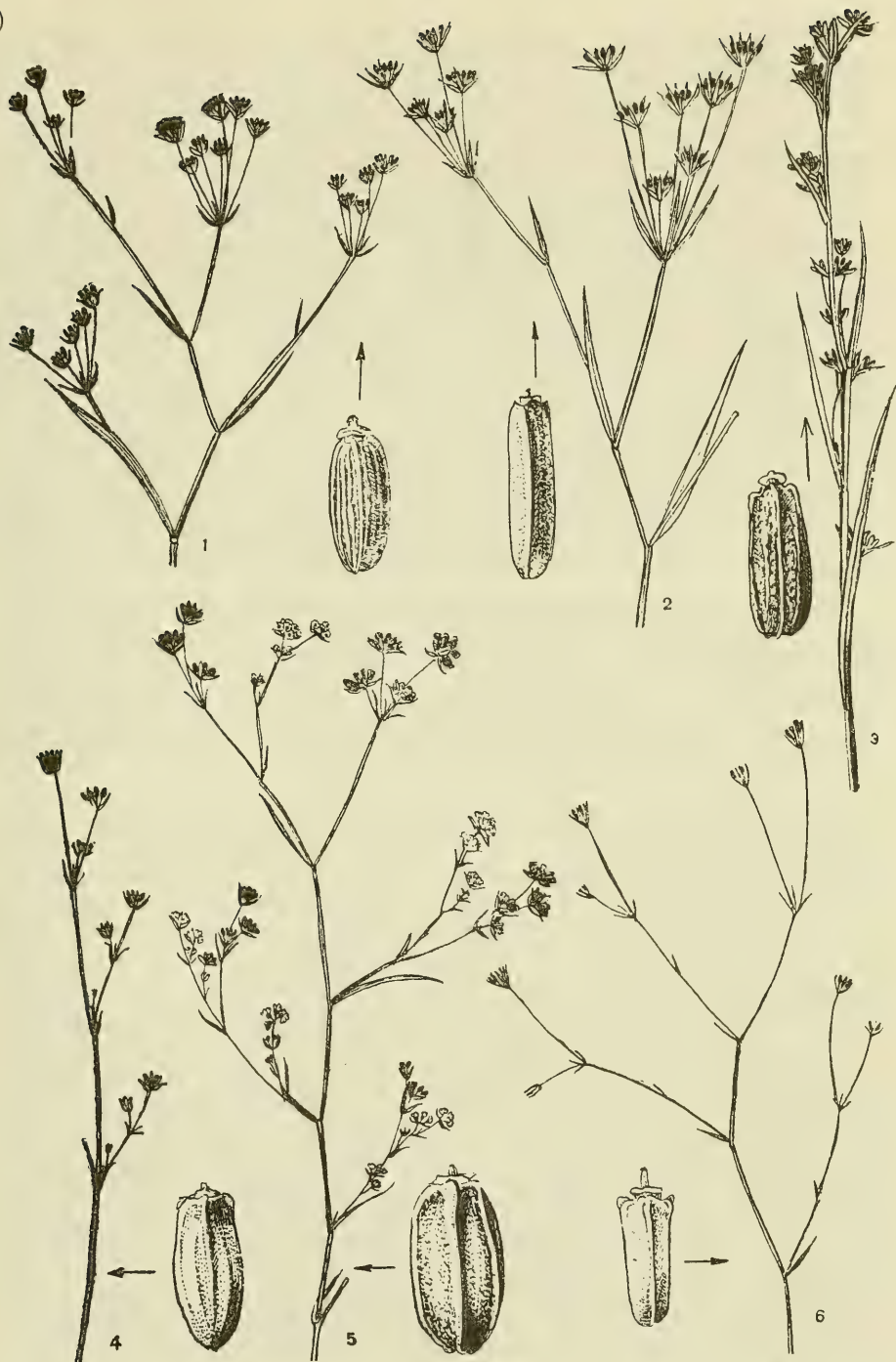


PLATE XXII. 1—*Bupleurum gerardii* All.; 2—*B. commutatum* Boiss. et Bal.; 3—*B. affine* Sadl.; 4—*B. boissieri* Post.; 5—*B. brachiatum* C. Koch.; 6—*B. pauciradiatum* Fenzl.
(Fruits enlarged 12 times.)

Perennial; stems numerous (5–10 and more), 40–80(150) cm high, ascending from more or less strongly, sometimes rather highly woody, multicapital base, thin, more or less erect or slightly angular-flexuose, more or less long, repeatedly spreading-paniculately branching nearly from base or only in upper part; all leaves narrowly linear, rarely linear-lanceolate, 3–5-nerved, acuminate or obtuse; radical and lower cauline leaves more or less tapering to petiole, with petiole to 6–10 cm long, 0.3–0.5 cm wide; median and upper cauline leaves sessile, often folded, lengthwise, to 8–12 cm long, 0.2–0.4 cm wide, markedly decreasing in size, in upper part of stem and on branches. Umbels numerous, together often appearing like a loosely paniculate inflorescence, small, of 2–6(10) unequal 0.5–1.5(3) cm rays; involucre of 1–3 small lanceolate leaflets; involucels of 5 elliptic or lanceolate leaflets, 1–3-nerved, ca. 1–1.5 mm long, 0.5 mm wide, much shorter than umbellets; flowers 5–10 per umbellet, on ca. 1 mm
 327 pedicels; petals pale yellow; stylopodium dark yellow; fruit ovoid or oblong-ellipsoid, 3–5 mm long, ribs filiform to more or less winged; oil tubes 3(5?) in valliculae. Fl. July–August, Fr. September–October.

Stony and fine-earth mountain slopes. — European part: Crim.; Caucasus: everywhere; Centr. Asia: Dzu.-Tarb., Mtn. Turkm., Pam.-Al., T. Sh. Gen. distr.: Arm.-Kurd., Iran. Described from the Caucasus. Type in Leningrad.

Note. Within the circumscription here accepted this species is not quite homogeneous and one day it will surely have to be separated into small geographic races. One of these could be *B. lipskyanum* (K.-Pol.) Lincz. comb. nova (= *B. falcatum* ssp. *exaltatum* var. β . *linearifolium* f. 3. *Lipskyanum* K.-Pol. in Tr. B. S. XXX (1914) 214) from Pamir-Alai, distinguished by its few, short branching stems, undeveloped few-rayed lateral umbels, etc.

28. *B. woronowii* Manden. in Bot. mat. Gerb. BIN AN SSSR, XIII (1950) 170. — *B. exaltatum* M. B. Tabl. prov. Casp. (1798) 113 et Besch. Länd. Casp. (1800) 156, p. p. ($1\frac{1}{2}$) quoad pl. taur.; DC. Prodr. IV, 131, p. p. quoad pl. taur.; Ldb. Fl. Ross. II, 266, p. p. min. quoad pl. taur. (an omn.?). Stev. in Bull. Soc. Nat. Mosc. XXIX, 3 (1856) 342 (Verz. taur. Pfl. No. 576). — ? *B. exaltatum* Grossg., Fl. Kavk, III, 150 and Opred. rast. Kavk. 224, p. p. min. — *B. falcatum* var. β . *exaltatum* Briq. Monogr. Bupl. Alp. Marit. (1897) 94, p. p. quoad pl. taur. — *B. falcatum* ssp. *exaltatum* var. α . *euexaltatum* Wolff in Pflanzenr. IV, 228, 134, p. p. quoad pl. taur.; K.-Pol. in Tr. Bot. Sada, XXX, 214 and in B. Fedch., Fl. Az. Ross. 10, 1, 25. — *B. baldense* M. B. Fl. taur.-cauc. I (1808) 203 et III (1819) 196, p. p. ($1\frac{1}{2}$) quoad pl. taur.; Boiss. Fl. or. II, 848, p. p. min. quoad pl. taur.; Shmal'g., Fl. I, 390 et auct. ross. plur. p. p. quoad pl. taur.; non Turra (1780), nec Host (1797). — *B. junceum* Pall. Ind. taur. sec. M. B. l. c. (1808) et herb. Pall. — *Isophyllum baldense* Hoffm. Gen. Umbell. ed. 2 (1816) 115. — Exs.: Callier, It. taur. (1896) No. 100.

Biennial or perennial (probably monocarpic); root rather thick, more or less long-conical, usually vertical, not branching above, uncipital; stems 80–100 cm high, single, very rarely few, borne lateral on the top of the root, at base more or less densely covered with remnants of petioles, rather thick (to 5–6 mm), more or less erect, rapidly tapering above,

distinctly flexuose, more or less long with repeated false dichotomies from middle up, rarely nearly from base; radical leaves rather numerous, 328 narrowly linear, distinctly expanding to semi-amplexicaul base, acuminate, to 20 cm long, 3–4 mm wide, with 5–7 rather sharp nerves; lower and median cauline leaves similar but slightly shorter, narrower and less broadly amplexicaul; upper and uppermost leaves to 0.5–1 cm long, ca. (less) 1 mm wide, slightly decreasing in size, tapering to very narrow (nearly subulate)-linear petioles. Umbels usually numerous, often resembling a loosely paniculate inflorescence, rather small, the lateral umbels distinctly smaller than the axial; axial umbels of 6–8, usually more or less curved, thin, rather widely divergent, sharply unequal, 1–2(3) cm rays; involucre of 4–5 unequal, lanceolate or oblong-ovate, acute 1.5–3(5) mm long leaflets, appressed to rays or slightly curved; involucels of 5 broadly lanceolate or nearly ovate, acuminate, 3-nerved leaflets 1.5–2 mm long, and about 1 mm wide, half the length of the flowering umbellets, appressed to umbellets or slightly curved; flowers 5–10 per umbellet, on 3 mm long pedicels; petals bright yellow; stylopodium brown (?); fruit oblong-ellipsoid, light brown, 3–3.5(4) mm long, with many longitudinal furrows in valleculae and short, narrowly winged ribs; oil tubes usually 5 per valleculae, 6–8 at commissure. Fl. July–August, Fr. August–September.

Stony slopes and cliffs, shrubby thickets, lower mountain belt; "coastal meadows and hills" (Bieberstein). — European part: Crim. (southern shore); Caucasus: Cisc. (?), western part, W. Transc. (near Novorossiisk). Described from the area between Anapa and Krymskaya (Natukhaiskaya). Type in Tbilisi, paratype in Leningrad and Tbilisi.

Note. A unique species, distinguished from *B. exaltatum* M. B. s. s. mainly by its biology (Bieberstein himself confused it with the latter species in his description, as did the authors who followed him); in all probability it is the biennial or perennial (variant) of the monocarpic type, nearly always with just a single stem. *B. exaltatum* M. B. s. s. is a typical multicaulescent perennial, often with very woody caudex, and then a typical semishrub. This peculiarity of the Crimean "*B. exaltatum* M. B." (i. e., *B. woronowii* Manden.) was first noted by De Candolle (l. c.), referring to Steven, and later by Steven himself (l. c.) and Boissier (l. c.), who considered the development of the root and caudex a sufficient reason to separate the very complex "*B. baldense*" from *B. linearifolium* DC. It has since become clear that the latter is none other than the original (s. s.) *B. exaltatum* M. B. (see Note to 329 preceding species — *B. exaltatum* M. B.). Wolf (l. c.) remarked that some forms of his *B. falcatum* ssp. *exaltatum* var. *euexaltatum* (no precise data are given) were monocarpic. Actually, Boissier is the only author who rated this character by making *B. exaltatum* M. B. s. l. a synonym of his "*B. baldense*"; the specimens cited show, however, that he failed to note together with *B. sibthorpiatum* Sm., *B. cernuum* Ten., *B. neglectum* Cesat. and others, thereby determining the kinship of their Russian submonocarpic forms of *B. exaltatum* M. B. s. l., i. e., *B. woronowii* Manden.

The present species is certainly related to the specific Mediterranean group of submonocarpic or fully monocarpic forms just mentioned as synonyms of "*B. baldense* Boiss." These are all very closely related, but their taxonomy is extremely complicated. The reliability of *B. woronowii* Manden. is subject to a critical study of the entire group.

29. *B. martjanovii* Kryl. in Tr. Bot. Sada, XXI (1903) 17 ("Martjanovi"); Kryl., Fl. Alt. II, 509; Wolff in Pflanzenr. IV, 228, 170 (in "*Sp. incertae sedis*"); K.-Pol. in Tr. Bot. Sada, XXX (1914) 204 and in B. Fedch., Fl. Az. Ross. 10, 1 (1915) 21; Kryl., Fl. Zap. Sib. VIII, 2007.— Ic.: K.-Pol., ibid. (1914) tabl. 4, fig. 5 (1915) fig. 9, paratypus!

Perennial; stems solitary, 20–70 cm high, thinly sulcate, nearly erect, thick (5–10 mm) at base, gradually tapering above, with large axial umbel (7–13 cm across) and smaller, lateral umbels terminating in thin (0.5–1 mm thick) branches usually from base of stem, diverging at an acute angle, sometimes (upper branches) slightly exceeding axial umbel; leaves more or less bright green, paler beneath, with 7–9 rather prominent arcuate nerves; radical leaves numerous, oblong-obovate, nearly spatulate to oblanceolate, very gradually tapering to rather short, flat petiole as long as blade or slightly shorter, slightly expanding below, short-acuminate, acute or obtuse, (with petiole) 4–15 cm long, (0.5)0.7–1.5 cm wide; cauline leaves sessile or (the lower) subsessile on short, linear, flat petioles, hardly expanding at base, not auricled, oblanceolate or lanceolate (the uppermost ovate-lanceolate, much smaller), more or less long-acuminate, acute rarely obtuse, 2–8(12) cm long, (0.3)0.5–1(1.5) cm wide. Axial umbel of 12–20(25) unequal, thin, arcuate, long 330 (4–6(8) cm) rays; lateral umbels on longer stems but much smaller, of 5–7(10) less curved rays to 3 cm long; involucre of 1–6 readily deciduous, unequal, lanceolate or sublinear, rather small leaflets to 1(1.5) cm long, 2–5 cm wide; involucre of lateral umbels much smaller; involucels of 5–8 narrowly linear-lanceolate or nearly subulate (1–)3-nerved leaflets 2.5–5 mm long, ca. 0.5 mm wide, nearly equal to umbellets or slightly shorter; flowers 10–15 per umbellet, pedicels ca. 2 mm long; petals pale yellow; stylopodium yellow (or violet?); fruit oblong-ovoid or elliptic, brown (when with glaucescent-violet tinge unripe), 3–4 mm long, with distinctly winged, acute, pale ribs; oil tubes 3 in valliculae, 4–6 toward commissure. Fl. June–July, Fr. August (September).

Stony slopes and cliffs in upper part of forest- and lower part of sub-alpine belt, ca. 1,500–1,750 m.— W. Siberia: Alt. (northeastern part); E. Siberia: Ang.-Say. (southwestern part). Gen. distr.: Mong. (NW, adjacent to Altai and Sayans). Described from Kuznetsk Ala-Tau (Bol'shoi Kyzas River valley) and W. Sayans (Borus Mountain and others). Type in Tomsk, isotype and paratype in Leningrad.

Note. A rare species of unique habit, and ambiguous affinity. We are provisionally including it in the Russian subsection *Arpopleurum*.

30. *B. tianschanicum* Freyn in Mém. Herb. Boiss. XIII (1900) 23 ("thianschanicum"); Wolff in Pflanzenr. IV, 228, 121.— *B. falcatum* ssp. *persicum* var. *β. densiflorum* f. 2 *thianschanicum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 227.— *B. falcatum* ssp. *persicum* var. *β. densiflorum* K.-Pol. in B. Fedch., Fl. Az.

Ross. 10, 1 (1915) 23, p. p. — *B. ranunculoides* Rgl. et Herd. in Bull. Soc. Nat. Mosc. XXXIX, 3 (1866) 74 (Enum. pl. Semen. No. 440).

Perennial; stems to 50–70 cm high, usually few (2–4), ascending from more or less tufted base, erect or slightly flexuose, usually with few short branches in upper part; radical leaves narrowly linear, tapering to rather long petiole, more or less acuminate, 8–12 cm long, ca. 2 mm wide, 3–5-nerved; lower and median cauline leaves linear-lanceolate, slightly tapering and more or less amplexicaul, gradually acuminate, 5–7(9-)nerved, ca. 10 cm long, 3–5 mm wide; uppermost leaves and leaves on branches much shorter, usually distinctly expanding in lower third, tapering towards base, long-acuminate, broadly lanceolate, 9–11-nerved, 1–3 cm long, 5–8 mm wide. Umbels rather small, the lateral distinctly smaller than the axial; 331 axial umbels of (3)5–7 thin, slightly arcuately curved, more or less equal or distinctly unequal 2–5 cm long rays; involucre of 2–3 unequal lanceolate leaflets, to 1.5 cm long, 3–4 mm wide, similar to upper leaves, sometimes deciduous; involucels of 7–9 nearly equal, lanceolate, rarely oblong-ovate, more or less long-acuminate, green, herbaceous leaflets 4–7 mm long, 1.5–2 mm wide, about as long as umbellets, rarely visibly longer, with 3 (very rarely 5) sharply prominent nerves; flowers 15–30 per umbellet, on very short 1–2 mm long pedicels; peripheral petals dark brown, with yellow margins and ligula (rarely all petals nearly pure yellow); stylopodium brown; fruit ovoid, dark brown, ca. 3 mm long, with acute, more or less winged, pale ribs; oil tubes ... Fl. July–August, Fr. August–September. (Plate XXI, Figure 1.)

Stony and aleurite slopes, subalpine and forest belts, usually in steppe (sheep's fescue) formations. — Centr. Asia: Dzu-Tarb. (Saur, Tarbagatai and Dzungarian Ala-Tau ranges), T. Sh. (northern and central parts: Kirghiz Ala-Tau, eastern part of Talass Ala-Tau Range, vicinity of Issyk-Kul Lake). Gen. distr.: Dzu.-Kash. (E. T. Sh.). Described from the eastern part of Central Tien Shan (Bayankol River valley, Broterus collections). Type in Helsinki.

Note. The relationship of *B. tianschanicum* Freyn is not quite clear. Most characters indicate its inclusion in the cycle of *B. falcatum* s. l., but such a character as, for example, the brown color of the outside of the petals (common to the group *B. triradiatum* Adams, *B. densiflorum* Rupr. and the Pyrenean *B. angulosum* L.), and the nearly pure yellow color of the petals found in some specimens, numerous transitions in the color and form of the petals and the considerable diversity in form and dimensions of the involucel leaflets lead us to assume that *B. tianschanicum* Freyn is a natural hybrid of *B. densiflorum* Rupr. and some species from the cycle of *B. falcatum* s. l.

Our drawing of *B. tianschanicum* Freyn (Table XXI, Figure 1) was made from the type specimen ("Thian Schan: in valle fl. Bajangol, reg. silv. super. 1896 VII 29, No. 753, V. F. Brotherus"), loaned from Helsinki.

31. *B. koso-poljanskyi* Grossh. in Tr. Tifl. bot. sada, ser. 2, I (1920) 13; Grossg., Fl. Kavk. III, 149; Takhtadzhyan in Zametkakh po sist. i geogr. rast. Tbilissk. bot. inst. Gruz. filiala AN SSSR, 9 (1940) 23 (descr. emend.); Grossg., Opred. rast. Kavk. 223.

332 Perennial; stems to 50–60 cm high, solitary or few (2–3?), with repeated false dichotomies, branching nearly from base (and therefore sharply angular-flexuose), with long, thin branches nearly capilliform toward tip; radical leaves broadly ovate to oblong-lanceolate (nearly spatulate), gradually tapering to rather long petiole, more or less acuminate or obtusely rounded, with short thin mucro, 5–7-nerved, 9–12 cm long, 2–2.5 cm wide; cauline leaves much smaller than the radical, oblong-cuneate to nearly oblong-spatulate, acuminate or more or less rounded, with short and thin mucro; median leaves 2–4 cm long, 0.5–1 cm wide; upper leaves smaller still, to 5 mm long, 1–2 mm wide. Umbels few, small, of (1)3–4 thin, unequal, nearly capilliform, 0.5–1.5 cm long rays; involucre of 2–3 small, unequal, ovate, appressed acute leaflets, 1–2 mm long, 0.5–1 mm wide; involucels of 4–5 broadly elliptic, lanceolate or ovate, short narrow, appressed acuminate leaflets, 3-nerved, ca. 1.5 mm long, ca. 1 mm wide; as long as or slightly shorter than flowering umbellets; flowers 10–15 (?) per umbellet, on ca. 1 mm long pedicels; petals yellow; stylopodium brown (?); fruit "oblong-linear, longer than pedicels, with rather broadly winged ribs"; oil tubes ... Fl. July, Fr. September (?).

Forests and shrubby thickets. — Caucasus: S. Transc. (near the Sanain railway station). Endemic. Described from locality cited. Type in Tbilisi, isotype in Leningrad.

Note. Though this species has been described twice, its morphology and affinity remain doubtful. Grossgeim, whose description was based on much too young specimens (just starting to blossom), considered it an annual (later (ibid. 1932 and 1949) "an annual or biennial (?)"), and compared it with other annual species. Takhtadzhyan, in extending the description (ibid.), noted that it appeared to be a perennial, but his description was much too brief, even omitting details of the fruit, which seems to have been in his possession judging by the date of further collections quoted by him (Davityan, 20 X 1939), and the discussion of the affinity of the species. With only Grossgeim's undeveloped specimens in our possession (isotype), we too are unable to decide which species are most closely related to *B. koso-poljanskyi* Grossh. We are therefore including it for the time being in our subsection *Arpopleurum*, noting that in some characters (i. e., shape of involucre and involucre leaflets) it may approach *B. abchasicum* Manden.

Section 2. TENOREA (Spreng.) K.-Kol. in Tr. Bot. Sada, XXX (1914) 166. — Ribs of fruit nearly inconspicuous to acute or narrowly winged; evergreen shrubs or semishrubs.

333 Subsection 1. CORIACEA (Godr.) K.-Pol., ibid., 166. — Leaves with 1 prominent nerve and more or less pinnate venation.

32. *B. fruticosum* L. Sp. pl. ed. 1 (1753) 238; DC. Prodr. IV, 133; Boiss. Fl. or. II, 851; Shmal'g., Fl. I, 391; Wolff in Engl. Pflanzenr. IV, 228, 168; K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2, 108 and in Tr. Bot. Sada, XXX, 252. — *Tenoria fruticosa* Spreng. Umb. prodr.

(1813) 32. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 45, f. 1; Drude in E.-P. Pflanzenr. III, 8, f. 65; Wolff, l. c. f. 21, A-C; Taliev, Rast. yuzh. ber. Kryma, fig. 77. — Exs.: Reverch. Pl. Andal. No. 268; Gandog. Fl. gall. No. 912; Baenitz; Herb. europ. No. 2339; Fiori, Bég. Pamp. Fl. It. exs. No. 589; Heldr. Herb. graec. norm. No. 1144; Aucher-Eloy, Herb. d'Or. No. 3633.

Shrub; evergreen, to 3 m high, with long upright, rather densely leafy branches; leaves subsessile, stiff, coriaceous, broadly lanceolate to obovate, tapering at base, obtuse with inconspicuous mucro, 5–8(12) cm long, 1.5–2.5(3.5) cm wide, glaucescent beneath, green and shiny above, with thin alveolate-netted nerves and thick prominent midrib. Umbels large, solitary, at ends of branches, of 5–25 nearly equal, more or less straight to 5 cm long rays; involucre of 5–6 unequal, yellowish-green, elliptic, ovate or obovate, obtuse, reflexed, caducous leaflets ca. 1 cm long, 5 mm wide; involucels of 5–6 broadly obovate, obtuse, green, caducous leaflets 4–6 mm long, shorter than umbellets; flowers 15–25 per umbellet, on unequal short pedicels; petals yellowish-green; fruit oblong-elliptic or oblong-ovate, smooth, shiny, brown, 6–8 mm long, with acute, slightly winged to bordered ribs; oil tubes 1 in valliculae (and inside ribs), 2 toward commissure. Fl. June–July, Fr. September–(October).

Cultivated as an ornamental in gardens and parks along the Crimean coast (Yalta, Alupka, Miskhor, Batiliman, Oreanda) and occasionally reported as locally escaped. Gen. distr.: W. and E. Med. (Portugal, Spain, Algeria, S. France, Corsica, Sardinia, Sicily, Lebanon), Bal.-As. Min. (Greece, Asia Minor). Described from S. Europe. Type in London.

Economic importance. A showy ornamental shrub suitable for southern regions with mild winters. It has a rather high content of essential oil (see "Economic importance" for the genus, p. 196).

Subgenus *Agostana* (S. F. Gray) K.-Pol. in Tr. Bot. Sada, XXX (1914) 167. — Genus *Agostana* S. F. Gray, Nat. arr. brit. pl. II (1821) 526. — Section *Eubupleura* Briq. Monogr. Bupl. Alp. marit. (1897) 52, 334 p. p. quoad subsect. *Aristata* (Godr.) Briq., *Juncea* Briq., *Trachycarpa* (Lange) Briq.; Wolff in Pflanzenr. IV, 228 (1910) 59, p. p. quoad subsect. *Glumacea* (Boiss.) Wolff, *Juncea* Briq., *Trachycarpa* (Lange) Briq. — Characteristics contained in Key.

Section 1. *GRAMINEA* Boiss. Fl. or. II (1872) 835, p. p.; K.-Pol. in Tr. Bot. Sada, XXX (1914) 167. — Subsection *Juncea* Wolff in Pflanzenr. IV, 228 (1910) 78 and *Trachycarpa* Wolff, l. c. 99. — Leaflets of involucels herbaceous, not mucronate, unarmed, 1–3-nerved, usually flat, opaque; fruit smooth or scabrous (granular, rugose, papilliform).

Subsection 1. *LEIOCARPA* Lange em. K.-Pol. in Tr. Bot. Sada, XXX (1910) 167. — Fruit smooth.

Series 1. *Leiopetala* Wolff in Pflanzenr. IV, 228 (1910) 39; K.-Pol., in Tr. Bot. Sada, XXX (1914) 177. — Petals glabrous and smooth, very rarely finely tuberculate, (*B. boissieri* Post) always entire.

33. *B. gerardii* All. Auct. ad Syn. meth. stirp. hort. Taurin. (1774) 81 ("Gerardi") et Fl. pedem. II, 24, excl. syn. Jacq.; DC. Prodr. IV, 128; M. B. Fl. taur.-cauc. I, 204, p. p. III, 198; Ldb. Fl. Ross. II, 262, p. p.; Boiss. Fl. or. II, 845, p. p. excl. syn. Stev.; Shmal'g., Fl. I, 390, p. p.; Briq. Monogr. Bupl. Alp. marit. (1897) 104; Wolff in Pflanzenr. IV, 228, 88, p. p.; K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2, 110; Grossg., Fl. Kavk. III, 148 and Opred. rast. Kavk. 223. — *B. Gerardii* ssp. *eugerardii* K.-Pol. in Tr. Bot. Sada, XXX (1914) 254. — *Isophyllum Gerardii* Hoffm. Gen. Umbell. ed. 2 (1816) 115, p. p. — Ic.: Gérard, Fl. galloprov. (1761) 233, tab. 9 (*B. involucris* et *involucellis pentaphyllis*, etc.); Nees, Gen. X, 10, *Bupleur. f.* 37–48; Rchb. Pl. crit. II, f. 296; Paoletti, Ic. It. f. 2257. — Exs.: Reverch. Pl. andal. No. 403; Huter, Porta et Rigo, It. hisp. 1879, No. 206; Gandog. Fl. gall. No. 968; Bornm. It. syr. No. 641 et It. pers. II, No. 7146.

337 Annual; glaucescent- or brownish-green plant, with cylindrical slightly sulcate, more or less flexuose stems, 20–40 cm high, branching from base or middle, with more or less spreading branches; leaves linear to (the lower) linear-lanceolate, the lowermost with barely developed petiole, often obtuse, the remaining leaves sessile, acuminate, the largest with (3)5–7 (the upper usually with 3) nerves at base, 6–8 cm long, 5–6 mm wide; the upper leaves smaller, to nearly subulate. All umbels well developed, rather large, on long peduncles, of (3)5–10 more or less divergent, thin, slightly curved to 3–4 cm long rays, more or less equal or rather sharply unequal, some umbellets subsessile; involucre of 2–5 acute, narrow, nearly subulate, more or less equal leaflets resembling upper leaves, usually a few times shorter than the long umbel rays; involucels of 5 narrow, acute, nearly subulate leaflets, with 3 nerves at base and 1 above, more or less equal to flowering or fruiting umbellets or longer (rarely slightly shorter); flowers 4–8 per umbellet, short-pedicelled; petals small, greenish-violet or reddish; fruit ovoid or elliptic, blackish, 2–2.5 mm long, with thin ribs, and shallow longitudinal furrows in valliculae; oil tubes 3–5 in valliculae, 4–8 toward commissure, rarely nearly cylindrical. Fl. May–June, Fr. June–July. (Plate XXII, Figure 1.)

Clayey plains, dry mountains, sometimes shrubby thickets, seldom as a weed. — European part: Crim. (southern coast, rare); Caucasus: E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. (W. and C. Kopet Dag). Gen. distr.: Med. (W. and E., African part?), Bal.-As. Min., Arm.-Kurd., Iran. (western part). Described from Italy (?). Type in Turin.

Note. A critical species. Together with *B. commutatum* Boiss. et Bal., from which it is insufficiently distinguished, it requires further special study. In particular, there is needed a careful, comparative study of the ripe fruits of both species. Boissier (l. c.) incorrectly reduced *B. dichotomum* Stev. to a synonym of this species, but as Kozo-Polyanskii (ibid. 284, 319) pointed out, the latter is a synonym (later homonym!) of *B. pauciradiatum* Fenzl.

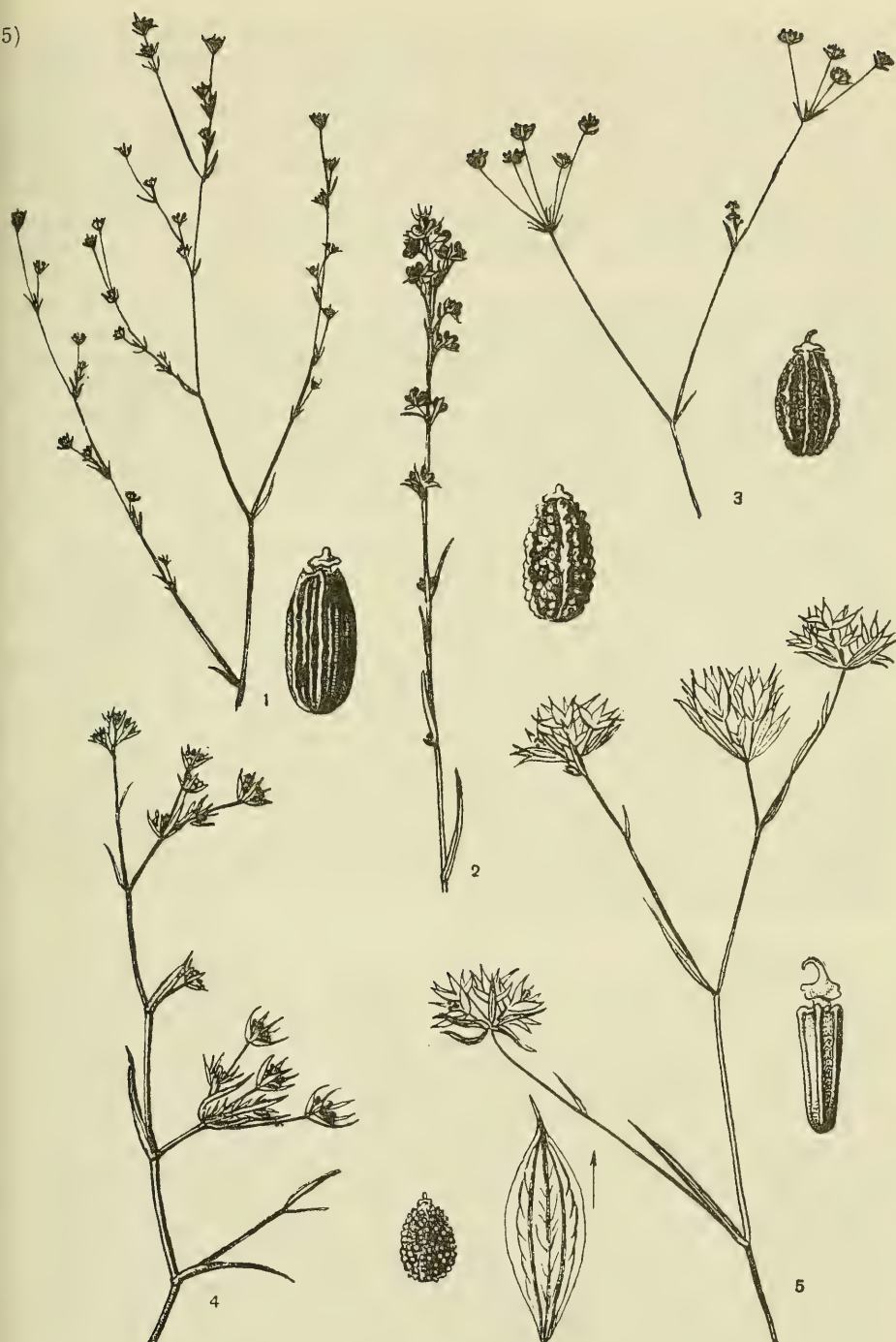


PLATE XXIII. 1—*Bupleurum asperuloides* Heldr.; 2—*B. tenuissimum* L.; 3—*B. marschalianum* C. A. M.; 4—*B. glaucum* Rob. et Cast.; 5—*B. aenigma* K. Pol. (below at left, leaflet of involucl. magnified 5 times). (Fruits magnified 12 times.)

34. *B. commutatum* Boiss. et Bal. in Boiss. Diagn. ser. II, 6 (1859) 75; Boiss. Fl. or. II, 844; Wettst. in Bibl. bot. V, 26 (1892) 52; Shmal'g., Fl. I (1895) 390; Wolff in Pflanzenr. IV, 228, 83, p. p.; K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2, 110; Grossg., Fl. Kavk. III, 148 and Opred. rast. Kavk. 223. — *B. Gerardii* ssp. *commutatum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 255. — Ic.: Rchb. Ic. fl. Germ. XXI, tab. 46, f. 1 (excl. f. 1, 4); Wettst. l. c. tab. III, f. 29–31, 35; Wolff, l. c. tab. 12, f. B–C. — Exs.: Balansa, Pl. or. 1857, No. 1233 et Reliq. Maill. No. 481 (typus et isotypi!); Bornm. It. anat. 1899, No. 4595; Görz, It. anat. 1931, No. 491.

Annual; very similar to preceding species, from which it differs by the better proportioned habit [sic]; the usually more or less bright green (not dull) color of the entire plant; the more crowded rays of umbels and umbel-
 338 lets; the slightly wider leaflets of involucels, linear-lanceolate (not narrow, nearly subulate), with 3 distinct nerves (extending all along the leaflet), leaflets often distinctly exceeding umbellet; petals orange or yellow; fruit oblong-ellipsoid to nearly linear, slightly longer (to 3 mm long); mericarps without longitudinal furrows (always?) in valliculae. Fl. May–June, Fr. June–July. (Plate XXII, Figure 2.)

The distribution of this species in the USSR overlaps with that of the preceding species (more abundant in the Crimea), in about the same environments. However, it seems to extend somewhat higher up in the mountains. Gen. distr.: Bal.-As. Min., Arm.-Kurd., Iran (western part). Described from Asia Minor (Phrygia). Type in Geneva, isotype in Leningrad.

Note. Kozo-Polyanskii (ibid. 1914) did not recognize *B. commutatum* Boiss. et Bal., as a species. Rather, in analogy with *B. gerardii* All. s. str., he considered it an "incompletely formed race" within his aggregate *B. gerardii*. Grossgeim (ibid.) distinguishes two separate species, but to establish the precise morphological boundaries between these species a critical study of abundant material and in nature is needed. At one time (1914) all Russian specimens of *B. commutatum* Boiss. et Bal. were determined by Kozo-Polyanskii as var. *pseudopachnospermum* K.-Pol. (ibid. 1914, 255).

35. *B. affine* Sadl. Fl. comit. Pesth. ed. 1, I (1825) 204; Boiss. Fl. or. II, 895; Shmal'g., Fl. I, 390; Briq. Monogr. Bupl. Alp. marit. (1897) 101; Wolff in Pflanzenr. IV, 228, 95; K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2, 109 and in Tr. Bot. Sada, XXX, 259; Thellung in Hegi, Ill. Fl. V, 2, 1118; Grossg., Fl. Kavk. III, 148 and Opred. rast. Kavk. 223. — *B. Gerardii* Ldb. Fl. Ross. II (1844) 262, p. p. non All. — *B. Gerardii* var. *breviradiatum* Rchb. Pl. crit. II (1824) 56. — *B. breviradiatum* Wettst. in Bibl. bot. V, 26 (1892) 52. — *B. Gerardii* var. *virgatum* Rchb. l. c. — *B. junceum* M. B. Fl. taur.-cauc. I (1808) 204, III (1819) 197 an p. p.? non L.; Besser, Enum. pl. Volhyn. 43; Ldb. l. c. p. p. excl. syn. Hoffm. — *Isophyllum junceum* Bess. l. c. non Hoffm. — Ic.: Rchb. l. c. tab. 164, f. 294, 295 et Ic. fl. Germ. XXI, tab. 46, f. 2; Hallier, Fl. Deutschl. XXVII, tab. 2749; Wolff, l. c. tab. 12, f. A; Thellung, l. c. fig. 2416. — Exs.: G. R. F. No. 2527, Callier, It. taur. (1900) No. 609; Dörfl. Herb. norm. No. 3428; Fl. Hung. exs. No. 245; Fl. exs. Reip. Bohem. Slov. No. 442.

Annual; glaucescent-green plant, to 50–80 cm high, with erect or more or less flexuose, rather thick stem more or less strongly branching from base, rarely almost unbranched, thinner branches often bearing rather numerous thin appressed branches; leaves linear-lanceolate, long-39 attenuate to acuminate, sessile, semi-amplexicaul, the lowermost slightly tapering to base, 5–7-nerved, to 10–15 cm long, 3–5 mm wide; upper leaves and leaves on branches smaller. Axial umbels well developed, on more or less long peduncles, of 3–8 erect, approximate, usually unequal 1–2(4) cm long rays; lateral umbels subsessile, undeveloped, of 1–3(5) reduced rays; involucre of 2–5 linear, acute, unequal leaflets to 2 cm long, 3–5-nerved; involucels of 5 linear or linear-lanceolate, long-acuminate leaflets 3–6 mm long, with prominent midrib, usually much exceeding flowering umbellets (3–4 times), rarely nearly equal; flowers 1–10 per umbellet, on more or less short, unequal pedicels, these often obsolete in lateral umbels; petals small, reddish (brick-red) or green; fruit ovoid or oblong-ovoid, brown, more or less shiny, 2.5–3 mm long, with thin filiform ribs and distinct secondary ribs, often slightly rugose in valliculae; oil tubes 1 in valliculae, 2 toward commissure. Fl. July–August, Fr. August–September. (Plate XXII, Figure 3.)

Dry slopes, shrubs, virgin steppes, sometimes as a weed at roadsides, and on vacant land. — European part: M. Dnp. (southern part), Bes., Bl., Crim. (southern coast); Caucasus: Cisc., W., E. and S. (western part) Transc. Gen. distr.: Centr. Eur. (southern part — Danube basin), Bal.-As. Min. Described from Hungary. Type in Geneva.

Note. Kozo-Polyanskii (ibid. 1914) singles out two rather easily distinguished varieties: 1) var. *breviradiatum* (Rchb.) K.-Pol. (= *B. gerardi* var. *breviradiatum* Rchb. l. c. — *R. affine* Sadl. l. c. s. str.) — stems upright-erect, with short appressed branches, the axial umbels of short, approximate unequal crowded rays; 2) var. *virgatum* (Rchb.) K.-Pol. (= *B. gerardi* var. *virgatum* Rchb. l. c.) — stems usually geniculate-flexuose, with longer declinate branches, axial umbels of rather long, more or less equal, divergent rays. As here accepted, a polymorphous species, requiring a special critical study of extensive material.

36. *B. Boissieri* Post in Journ. Linn. Soc. Bot. XXIV (1888) 426 et Fl. of Syria, etc., ed. 1 (1896) 342; Boiss. Fl. or. suppl. 251; Wolff in Engl. Pflanzenr. IV, 228, 92; K.-Pol. in Tr. Bot. Sada, XXX, 268; Grossg., Fl. Kavk. III, 149 and Opred. rast. Kavk. 223. — *B. asperuloides* K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII (1912) 108, p. p. [cp. K.-Pol., ibid. (1914) 269]. — Ic.: Wolff, l. c. tab. 11, f. A–E. — Exs.: Herb. Fl. Cauc. No. 137.

340 Annual; green or glaucescent-green plant, 50–70 cm high, with erect, rather thin, rounded, stems thinly sulcate below, slightly angular above, sparsely branching from base or middle, branches rather long, spreading, shortly appressed-branching or simple; lower leaves lanceolate, tapering to rather wide petiole, more or less attenuate-acuminate, 5–7 cm long, 3–4 mm wide, with 3–5 (often 3) nerves at base; median leaves not tapering as much at base, more acute, the upper leaves and leaves on branches much smaller, narrower, to nearly subulate. Axial umbels on more or

less long, to 2 cm peduncles, of 2–3 erect, approximate, strongly unequal scabrous rays, with finely serrate faces, 0.5–2 cm long; lateral umbels appressed to branches on short peduncles or sessile, of 1–2 short (approached) rays; involucre of 2–3 narrowly linear or nearly subulate, nearly equal, 3-nerved, 4–6 mm long leaflets, distinctly serrate-scabrous along midrib and margin, $\frac{1}{3}$ to $\frac{1}{4}$ the length of the long umbel rays; involu-
cels of 5 linear-subulate 2–4 mm long leaflets, nearly equal to flowering umbellets but more often slightly longer, with prominent scabrous midrib; flowers 3–5 per umbellet, very short-pedicel; petals very small, yellow, smooth or finely tuberculate-scabrous dorsally, never distinctly cucullate; fruit (unripe) more or less cylindrical, ca. 2 mm long, with thin filiform ribs; oil tubes 1 in valliculae, 2 toward commissure. Fl. August, Fr. September (?). (Plate XXII, Figure 4.)

Dry slopes, among shrubs. — Caucasus: W. Transc. (Novorossiisk?), E. Transc. (Tbilisi), Tal. (arid part — Zuvand). Gen. distr.: E. Med. (Syria), Bal.-As. Min. (Asia Minor). Described from N. Syria (Aman Range). Type in London (?).

Note. Very similar in habit to *B. asperuloides* Heldr., from which it is readily distinguished by the fruits which have 1, not 3, oil tubes in valliculae, the petals lacking dorsal papillae (or only uneven with callous tuberosity), never distinctly cucullate or dentate.

37. *B. brachiatum* C. Koch in Boiss. Fl. or. II (1872) 844; Wolff in Engl. Pflanzenr. IV, 228, 87; K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2, 109 and in Tr. Bot. Sada, XXX, 262; Grossg., Fl. Kavk. III, 149 and Oprod. rast. Kavk. 223. — *B. Gerardi* M. B. Fl. taur.-cauc. I (1808) 204, p. p. min.; Ldb. Fl. Ross. II, 262, p. p.; ? Shmal'g., Fl. I, 390, p. p. — *B. Lipskyi* Wolff, l. c. nomen. — Ic.: Wolff, l. c. tab. 11, f. F–J; K.-Pol., ibid. (1912) tabl. 5, fig. 18; (1914) tabl. 7. — Exs.: G. R. F. Nos. 2525, 2526.

341 Annual; green or slightly glaucescent plant, 80–100 cm high, with erect, rounded, thin, usually very strongly spreading-branching stem (often from base), with rather long, erect or more or less curved, strongly branching, rarely simple branches; all leaves linear, sessile (semi-amplexicaul), the lower to 10 cm long, 2.5–3.5(4) mm wide, with 5–7 nerves distinctly protruding beneath; upper leaves (and leaves on branches) much smaller, narrower, to nearly subulate. All umbels (or only axial) well developed, of 2–3(5) divergent, more or less erect, strongly unequal to 1.5–2 cm long rays (one usually very short, with subsessile umbellet); rays of lateral umbels often more or less reduced; involucre of 2–3(4) lanceolate, keeled, acuminate, nearly equal leaflets ca. 2–4 mm long, 3-nerved, $\frac{1}{7}$ – $\frac{1}{10}$ the length of the rays; involu-
cels of 5 lanceolate or elliptic, acuminate, stiff, 2–4 mm long leaflets, distinctly keeled along midrib, slightly exceeding flowering umbellets, sometimes as long or slightly shorter; flowers 10–15 per umbellet, short-pedicel; petals usually orange, rarely yellow or sulfur-yellow; fruit ovoid, brown, 1.5–2.5 mm long, with thin, more or less acute ribs; oil tubes 1 in valliculae, 2 toward commissure. Fl. July–August, Fr. August–September. (Plate XXII, Figure 5.)

Dry clayey and stony slopes, shrubby thickets. — European part: Crim. (southern coast, Kerch Peninsula); Caucasus: Cisc., W. Transc., E. Transc. (western part). Gen. distr.: Bal.-As. Min. (eastern part of Asia Minor). Described from Lazistan (?). Type in Geneva, isotype (?) was in Berlin.

Note. Kozo-Polyanskii (ibid. 1914) recognizes two varieties:

1) var. *genuinum* K.-Pol. — all umbellets equal, with rather long rays and well developed peduncles; 2) var. *depauperatum* K.-Pol. in Tr. Yur'evsk. bot. sada, XIII, 1 (1912) 13 (= *B. brachyactis* K.-Pol. l. c. (1914) 265, nomen) — lateral umbellets often undeveloped, all rays and peduncles short.

Series 2. *Exasperata* Wolff in Engl. Pflanzenr. IV, 228 (1910) 39; K.-Pol. in Tr. Bot. Sada, XXX, 177. — Petals finely papillate dorsally, dentate.

38. *B. pauciradiatum* Fenzl ex Boiss. Fl. or. II (1872) 848; K.-Pol. in Tr. Bot. Sada, XXX, 270 (descr. emend.); Grossg., Fl. Kavk. III, 148 and Opred. rast. Kavk. 223. — *B. asperuloides* β . *laxum* Fenzl in Tchihatch. As. Min. III, Bot. I (1866) 418; Wolff in Pflanzenr. IV, 228, 98, 99. — *B. junceum* M. B. Fl. taur.-cauc. I (1808) 204 an p. p., non L. —? *B. dichotomum* Stev. in Bull. Soc. Nat. Mosc. XXIX, 3 (1856) 342, sec. K.-Pol., *ibid.*, 284, 319, non Boiss. 1849. — *B. leptocladum* K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 1 (1912) 12 (description and drawing) and XIII, 2 (1912) 108. — *B. Wolffianum* Bornm. apud. 342 Wolff in Engl. Pflanzenr. IV, 228, 93. — Ic.: K.-Pol., *ibid.* (1912) (primo) fig. 1, 1912 (secundo) tabl. 5, fig. 10c (sub *B. leptoclado*). — Exs.: Kotschy, It. cilic. 1853, No. 78 (typus!).

Annual; pale green plant; stems 50–60 cm high, more or less erect or (especially upper part) rather strongly angular-flexuose, thin, rounded, thinly furrowed below, slightly angular above, branching from middle (sometimes from base), rather rarely false dichotomous, with long, thin (sometimes to subcapilliform) spreading, dichotomously branching branches, often with drooping tips; lower leaves short-petioled, lanceolate or oblong-lanceolate, acuminate or attenuate-acuminate, like median leaves often rather long, to 6–10 cm and to 5(15?) mm wide, 5–7(9)-nerved at base (usually 3 above); upper leaves (and leaves on branches) much smaller, narrower, nearly subulate, to 2–5 mm long, ca. 0.5 mm wide. All umbels on more or less developed peduncles, usually as long as long rays; axial umbels of 2, very rarely 3, thin, unequal or nearly equal, erect or curved, divergent, to 2–3 cm long rays; lateral umbels usually of 1 slightly shorter ray (very rarely of 2); involucre of 3(4) appressed, short, linear-subulate or sublanceolate 1–4 mm long, 1–3-nerved leaflets, $\frac{1}{5}$ to $\frac{1}{10}$ the length of the rays; involucl of 5 leaflets very similar to those of involucre, with prominent midrib nearly equal to flowering umbellets; flowers 3–7 per umbellet, on short pedicels nearly as long as ovary; petals very small, yellow, finely papillate dorsally, denticulate; fruit (unripe) ovoid, truncate, ca. 2 mm long, with inconspicuous filiform ribs; oil tubes 1–3 in valleculae, 2(?) toward commissure. Fl. July–August, Fr. August–September. (Plate XXII, Figure 6.)

Dry slopes and among shrubs. — European part: Crim. (southern coast); Caucasus: E. Transc. Gen. distr.: Bal.-As. Min. Described from Asia Minor (Cilician Taurus). Type in Vienna (?), isotype in Leningrad.

Note. Kozo-Polyanskii (ibid. (1914) 271) distinguished 3 varieties: 1) var. *kotschyanum* K.-Pol. (*B. asperuloides* β . *laxum* Fenzl, l. c.) — all umbels with rather short peduncles and short, usually very unequal, slightly divergent rays; 2) var. *leptocladum* K.-Pol. (*B. leptocladum* K.-Pol. l. c.) — all umbels well developed, with long peduncles and long, divergent rays; axial umbels of 2 rays, lateral of 1; 3) var. *wolffianum* (Bornm.) K.-Pol. (*B. wolffianum* Bornm. l. c.) — all umbels well developed, large, usually of 2 rays; large plants with broad leaves.

- 343 39. *B. asperuloides* Heldr. in Boiss. Diagn. ser. II, 6 (1859) 76; Boiss. Fl. or. II, 848; K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2, 108 and in Tr. Bot. Sada, XXX (1914) 273; Grossg., Fl. Kavk. III, 148 and Opred. rast. Kavk. 223. — *B. asperuloides* α . *strictum* Fenzl in Tchihatch. As. Min. III, Bot. I (1866) 418; Wolff in Pflanzenr. IV, 228, 98. — Ic.: K.-Pol., ibid. (1912) tabl. 5, fig. 10b; (1914) tabl. 9, fig. 11. — Exs.: Heldr. Herb. graec. norm. No. 513 (typus!); G. R. F. No. 1719 (sub *B. pauciradiato*); Herb. Fl. Cauc. No. 435 [Fasc. IX (1931)].

Annual; glaucescent-green plant, to 80–100 cm high; stem erect or slightly flexuose above, thin, rounded below, thinly sulcate, slightly angular above, from base or middle, more or less branching by false dichotomies, branches rather long, more or less spreading, thin, more or less erect or flexuose, usually simple; leaves sessile, linear, rarely narrowly linear-lanceolate, acuminate or attenuate-acuminate, rarely obtuse; lower and median leaves often rather long, 5–15 cm, ca. 5 mm wide, 5–9-nerved at base (usually 3-nerved above base); upper leaves small, nearly subulate. Axial umbels well developed, on more or less long peduncles, with 2–3(5) markedly unequal, straight, approximate, 1.5–3 cm long rays; lateral umbels subsessile or sessile, of 1 reduced ray (very rarely of 2), usually with subsessile or sessile, nearly spicately arranged umbellets; involucre of 2–3 appressed, subulate or linear-lanceolate 4–5 mm long, 3-nerved leaflets, $\frac{1}{3}$ to $\frac{1}{2}$ the length of the umbel rays; involucels of 5 linear-subulate leaflets 2–3 mm long, slightly exceeding flowering umbellets, with prominent upper nerve; flowers 2–5(7) per umbellet, on very short pedicels; petals very small, yellow, with reddish tip, distinctly cucullate, dorsally with small papillae, more or less dentate; fruit ovoid-elliptic, more often cylindrical, brown, 2–2.5(3) mm long, with thin filiform ribs, deeply furrowed in valliculae; oil tubes 3 in valliculae, 4 toward commissure. Fl. July–August, Fr. August–September. (Plate XXIII, Figure 1.)

Dry stony places, sparse shrubby thickets. — European part: Crim. (southern coast); Caucasus: W. Transc. (Anapa, Novorossiisk, Gelendzhik). Gen. distr.: Bal.-As. Min. Described from Greece (Mount Parnassus). Type in Paris (Cosson Herbarium?), isotype in Leningrad.

Subsection 2. TRACHYCARPA Lange in Willk. et Lange, Prodr. Fl. hisp. III (1874) 68; K.-Pol. in Tr. Bot. Sada, XXX (1914) 168. — Fruit scabrous, rugosely papilliform or tuberculate ("granular").

40. *B. tenuissimum* L. Sp. pl. ed. 1 (1753) 238; DC. Prodr. IV, 127; Ldb. Fl. Ross. II, 261; Boiss. Fl. or. II, 841; Shmal'g., Fl. I, 391; Briq. Monogr. Bupl. Alp. marit. (1897) 109; K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2, 108 and in Tr. Bot. Sada, XXX, 278; Grossg., Fl. Kavk. III, 147 and Oprod. rast. Kavk. 222. — *B. tenuissimum* ssp. *eutenuissimum* Wolff in Pflanzenr. IV, 228 (1910) 102. — *Odontites tenuissima* Spreng. Prodr. Umbell. (1813) 33; Hoffm. Gen. Umbell. ed. 2, 116; M. B. Fl. taur.-cauc. III, 198. — Ic.: Nees, Gen. X, 10, f. 15–19; Dietrich, Fl. boruss. XI, 1, 765; Rchb. Ic. fl. Germ. XXI, tab. 30, f. 2; Paoletti, Ic. It. f. 2256; Wolff, l. c. tab. 13, f. A–B. — Exs.: G.R.F. No. 2529; Fl. exs. austro-hung. No. 2103; Fl. exs. Reip. Bohem. Slov. Nos. 48, 1080; Fl. Hung. exs. No. 248; Fiori et Beguinot, Fl. It. exs. No. 1710.

Annual; glaucescent-green plant, 10–40 cm high; stems flexuose, thin, more or less rigid, usually branching from base (sometimes also in upper part), with rather long, short-branching or simple branches, arcuate at base, declinate or erect; leaves linear or narrowly linear-lanceolate, usually 3-nerved; lower leaves slightly attenuate toward petiole, the remaining leaves sessile, all with more or less long mucro, rarely obtuse, 2–5 cm long, 1–4 mm wide. Axial umbels on more or less developed peduncles, with 3–5 strongly unequal, approximate rays, 2 cm long; lateral umbels subsessile or sessile, sometimes nearly spicately arranged, of 1–3 very short rays; involucre of 3–5 unequal, 3-nerved, linear-lanceolate, 3–10 mm long leaflets nearly as long as shorter umbel rays; involucels of 5–6 linear, 3-nerved, long-mucronate, 3–6 mm long leaflets, 2–3 times, rarely almost as long as flowering umbellets; flowers 3–5 per umbellet on very short, unequal pedicels; petals very small, more or less reddish or red-yellow; stylopodium yellowish-red(?); fruit ovoid-globular, usually brown, 2–3 mm long, distinctly compressed laterally, with distinct, acute, more or less undulant ribs; valliculae usually strongly rugose-tuberculate; oil tubes 3 in valliculae, 4–6 toward commissure. Fl. July–August, Fr. September. (Plate XXIII, Figure 2.)

Margins of solonchaks, dry localities. — European part: Balt. (reported as introduced for Ezel Island), U. Dns. (Lysaya Gora near Uzhgorod), Bes., Bl., Crim.; Caucasus: Cisc. (Stavropol), E. Transc. (reported by Boissier (l. c.) near Gori, but subsequent collections do not appear to confirm this). Gen. distr.: Scand. (S. Sweden and Denmark), Centr. and Atl. Eur., Med., Bal.-As. Min. Described from W. Europe. Type in London.

Note. Kozo-Polyanskii (ibid. 1914) refers the Russian plant to var. *genuinum* Godr. (in Gr. et Godr. Fl. Fr. I (1848) 723), which he characterizes by the high stem with long basal branches and subsessile, often undeveloped lateral umbellets. He recognizes two forms: f. *longibracteatum* Wolff (l. c. 103) — involucels distinctly longer than umbellets, and f. *brevibracteatum* Wolff (l. c. 103) — involucels more or less equal to umbellets.

"*B. tenuissimum* L." undoubtedly hides within its distribution area a wide range of small species, some of which have already been distinguished by earlier authors (for example, *B. columnae* Guss., *B. procumbens* Desf.). Until a monograph of the entire cycle becomes available, *B. tenuissimum* L. must be considered as an aggregate species, although within much narrower limits than those accepted by Wolff (l. c.).

41. *B. marschallianum* C.A.M. Verz. Pfl. Kauk. (1831) 123; Boiss. Fl. or. II, 842; Shmal'g., Fl. I, 391; Fedch. and Fler., Fl. 684. — *B. gracile* (M. B.) DC. Prodr. IV (1830) 128; Ldb. Fl. Ross. II, 262; K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2, 108 and in Tr. Bot. Sada, XXX, 275; Grossg., Fl. Kavk. III, 147 and Opred. rast. Kavk. 222, non Urv. (1822). — *Odontites gracilis* M. B. in Hoffm. Gen. Umbell. ed. 2 (1816) 209, nomen; M. B. Fl. taur.-cauc. III, 198. — *B. tenuissimum* ssp. *gracile* Wolff in Pflanz. IV, 228 (1910) 104. — Ic.: Eichwald, Pl. nov. casp.-cauc. I (1831) tab. 10. — Exs.: Fl. cauc. exs. No. 317.

Annual; green or glaucous-green plant, 40–60(100) cm high, stem erect, angular, usually strongly spreading-branching nearly from base; leaves lanceolate or linear, distinctly tapering at base, acute or obtuse, all with short mucro, 3–7-nerved, 3–4(8) cm long, 3–7 mm wide, upper leaves usually shorter, wider, sometimes to nearly obovate. Umbels uniformly developed, on more or less long peduncles, of 2–3(6) discernibly unequal, rarely nearly equal, straight, spreading rays to 2(3) cm long; involucre of 2–3 nearly equal, 3-nerved, narrowly or more or less broadly lanceolate leaflets, usually much shorter than umbel rays; involucels of 5 narrowly or more or less broadly lanceolate, 3-nerved, short- or rather long-mucronate, 1–4 mm long leaflets, equal to or slightly shorter than flowering umbellets (rarely slightly longer); flowers 3–8 per umbellet, on short unequal pedicels; petals very small, yellow, rarely (when dry?) reddish; stylopodium greenish-yellow or (in unripe fruits) reddish; fruit cylindrical-ovoid, brown, ca. 2 mm long, distinctly pediceled, with thin, faint ribs, and densely and finely rugose-papilliform ("granular") valliculae; oil tubes cylindrical, very narrow. Fl. July–September, Fr. September–October. (Plate XXIII, Figure 3.)

- 346 Solonchik, clayey or sandy soils, seacoasts, stony and clayey slopes in lower mountain belt, often in fields as a weed. — European part: Bes. (?), Bl., Crim., L. Don, L. V. (southern part); Caucasus: Cisc., Dag., E. and S. Transc. (?), Tal. Gen. distr.: Bal.-As. Min., Arm.-Kurd., Iran. (north-western part). Described from the Caucasus (vicinity of Kizlyar). Type and paratype in Leningrad.

Note. Like the preceding species, *B. marschallianum* is one of a critical group of small species. To Wolff (l. c.) it is one of two sub-species of the aggregate *B. tenuissimum* (with 6 varieties and 9 forms!). Kozo-Polyanskii (ibid. 1914), partly following Wolff, cites 3 forms for the USSR, which are rather difficult to distinguish. Most specimens in the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR from both the Caucasus and the Crimea, here referred to f. *rossicum* Wolff (l. c.), f. *filiforme* Wolff (l. c.) which, according to Kozo-Polyanskii, is more rare (known from the Caucasus and the Crimea; the type specimens in the Bieberstein herbarium should apparently be referred here), and to f. *himalaicum* C. Koch (in Linnaea, XVI, 357), distinguished by Ledebour (l. c.), an even rarer low-growing form. Grossgeim (ibid. 1932) reports all 3 forms for the Caucasus. The group requires monographic treatment, with extensive observations in nature over the entire distribution area.

42. *B. glaucum* Rob. et Cast. in Lam. et DC. Fl. Fr. ed. 3, VI (1815) 515; DC. Prodr. IV, 127; Ldb. Fl. Ross. II, 1, 261; Boiss. Fl. or. II, 842; O. and B. Fedch., Perech. rast. Turk. 2, 89; Grossg., Fl. Kavk. III, 147 and Opred. rast. Kavk. 222.— *B. semicompositum* var. α . *glaucum* Wolff in Pflanzenr. IV, 228 (1910) 106; K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2, 108, 110; in Tr. Bot. Sada, XXX, 281 (var. β) and in B. Fedch., Fl. Az. Ross. 10, 1, 38.— *Odontites glauca* Spreng. in Roem. et Schult. Syst. VI (1820) 383.— Ic.: Rchb. Ic. fl. Germ. XXI, tab. 208, f. 2; K.-Pol., ibid. (1915) fig. 16.— Exs.: G.R.F. No. 2528; Herb. Fl. Cauc. No. 138; Billot, Fl. Gall. et Germ. exs. No. 3096; Letourneux, Pl. aegypt. No. 64 bis; Balansa, Pl. or. 1854, No. 61; Bornm. It. syr. 1897, No. 637.

Annual; greenish-glaucous or glaucous plant, 5–15(25) cm high, with angular-flexuose, rather rigid stem branching (sometimes strongly so) from base, usually with declinate, also angular-flexuose branching or simple branches; leaves thickish, linear-lanceolate, the lower oblong-lanceolate, tapering at base, where slightly expanding and gradually acuminate, to 5–6 cm long, 2–5 mm wide; all 3–5-nerved, usually more or less canaliculate, remaining leaves smaller, narrow, acute. Most umbels more or less equally developed, of 4–5(7), thick, acutely scabrous, sharply unequal (2–3 longer, others very short) rays. Axial umbels on more or less long peduncles usually smaller; lateral umbels often sessile, usually larger; involucre of linear-lanceolate leaflets varying considerably in number and size, several times as long as short umbel rays; involucels of 5 linear-lanceolate or linear-subulate, long-mucronate, more or less spinose leaflets with 3 prominent nerves, usually much longer than umbellets; flowers 5–10 per umbellet, on short unequal pedicels, sometimes sessile; petals glaucescent-yellowish or reddish (when dry?); stylopodium reddish-yellow (?); fruit globular or cylindrical-ellipsoid, blackish-glaucous, 1–1.5 mm long, with quite inconspicuous ribs, its surface densely covered with fine vesicular-papilliform ("granular") indumentum; oil tubes 3 in valliculae, 2 toward commissure. Fl. April–May, Fr. June. (Plate XXIII, Figure 4.)

Clayey plains, sands and sandy-stony slopes, solonchaks, coastal waters.— European part: L. Don (?); Caucasus: E. Transc. (eastern part); Centr. Asia: Kara K. (southern part of Caspian area). Gen. distr.: Med., Bal.-As. Min., Iran. (western part). Described from S. France (Marseilles). Type in Paris (?).

Note 1. In addition to *B. semicompositum* var. *glaucum* Wolff (i.e., *B. glaucum* Rob. et Cast. as understood by us and many other authors), Kozo-Polyanskii (ibid. 1914) also cited for Russian territory *B. semicompositum* var. *pseudodontites* (Rouy) Wolff (in Pflanzenr. IV, 228 (1910) 107), which he considered a variety of var. *glaucum*. Elsewhere (ibid. 1915) he writes on this point: "A second modification: var. β . *pseudodontites* Wolff! l. c. p. 107 = *B. semicompositum* L. s. str.— tall and more broadleaved, rare in nature but often obtained in cultivation from var. *glaucum*." We have not seen the specimens cited by Kozo-Polyanskii from the "Don region." New collections do not appear to confirm this locality.

Note 2. Kozo-Polyanskii (ibid. 1914, 1915) referred to the fact that *B. glaucum* was as yet unknown, but expressed his belief that it would surely be found east of the Caspian Sea. In the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR, such a specimen does exist, collected by Raddi in the Atrek River valley near Chat in 1886; also, there are Karelin's specimens with the doubtful label "*Turcomania borealis*."

Section 2. GLUMACEA Boiss. Fl. or. II (1872) 835; K.-Pol. in Tr. Bot. Sada, XXX, 168.— Subsection *Glumacea* Wolff in Pflanzenr. IV, 228 (1910) 59.— Subsection *Aristata* Briq. Monogr. Dupl. Alp. marit. (1897) 52.— Leaflets of involucels scarious, usually transparent, 3–9-nerved with awn or spine; fruit smooth.

348 Series 1. *Aristata* Wolff in Pflanzenr. IV, 228 (1910) 61.— Leaflets of involucels more or less long-awned.

43. *B. aenigma* K.-Pol., Izv. Petrogr. Bot. sada, XVII, 1 (1917) 112.—? *B. aristatum* Ldb. Fl. Ross. II, (1844) 263, non Bartl.—? *B. divaricatum* K.-Pol. in Tr. Yur'evsk. Bot. sada, XIII, 2 (1912) 108, non Lam.— *B. sulphureum* K.-Pol. in Tr. Bot. Sada, XXX (1914) 283, p. p. *quoad* synonym. Ldb.— *B. Chimaera* (errore) K.-Pol., ibid. (1917) 115, nomen.

Annual; yellowish-green plant, 10–20 cm high, with geniculate-flexuose, rarely falsely dichotomous stem with thin, stiffish, nearly simple branches; all leaves narrowly linear-lanceolate or linear, attenuate-acuminate, the lower with weakly developed petiole, the others sessile, the median 3–5 cm long, 1–2 mm wide, 3–5-nerved, the upper (and leaves on branches) much smaller, narrower. Umbels rather numerous, small, on thin, angular (tetrahedral) peduncles approximately twice as long as rays, of 5–6 straight more or less divergent, yellowish, 3–7-mm long unequal rays; involucre of 4–5 nearly equal, lanceolate, acute, short-awned, herbaceous-scarious, green (later yellowish) leaflets with transparent margins, 8–9 mm long without 1.5–2 mm long awn, 2–2.5 mm wide, approximately $1\frac{1}{2}$ times as long as rays; involucels of 5 leaflets, very much like those of involucre but half as large, ca. 5–7 mm long, 1.5–2(3) mm wide, with 1–1.5 mm long awn, twice as long as flowering umbellets becoming yellowish after flowering, semitransparent, with 3 distinct, profusely branching nerves, with transparent edge $\frac{1}{6}$ – $\frac{1}{8}$ ($\frac{1}{16}$) the width of the leaflet; flowers to 10 per umbellet, on very short, equal, ca. 1 mm long pedicels; petals ca. 0.5 mm long, yellowish, with translucent, reddish-yellow or brown oil tubes, obovate or rhombic, hoodlike base rounded, with rather large single apical tooth (or truncate, with several small teeth), else entire; fruit (unripe) narrowly obprismatic (sublinear), brown, ca. 2 mm long, with thin acute ribs, smooth in valliculae. Fl.? Fr.? (Plate XXIII, Figure 5.)

Distribution not known precisely.—Caucasus: W. Transc. (Sukhumi, Ivanov). Endemic. Described from near Sukhumi. Type in Moscow (Herbarium of the Timiryazev Agricultural Academy), isotype in Leningrad

Note. Small species, closest to *B. sulphureum* Boiss. et Bal., but easily distinguished from it mainly by the character of dentation, the shape of the petals and some other characters. After the description of *B. aenigma* K.-Pol. in 1917 (thanks are due to M. I. Nemtsov for making available the relevant specimens) the question whether representatives of section *Glumacea* Boiss. grow in the Caucasus was settled. However, the old "Ledebour mystery" about *B. aristatum* Ldb. (K.-Pol., *ibid.* 1917, 114, 115) remained unsolved because the specimen cited by Kozo-Polyanskii (*ibid.* 1914, 284 and 1917, 114) and preserved in the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR under the label "*Bupleurum tenuissimum?* DC. *prodr.* Caucasus?" and the later comment, "Nordmann. In Caucaso non reperitur," appeared at one time to be *B. apiculatum* Frivaldsky, not identical with *B. aenigma* K.-Pol. The source of this specimen also remains doubtful.

Genus 989. **TRINIA** * Hoffm.

Hoffm. *Gen. Umbell.* ed. 1 (1814) 92. *Apinella* Neck. *Elem.* (1790) 191, nom. rejecendum. — *Cicutaria* Moench, *Meth. Suppl.* (1802) 32, ex p. — *Rumia* Ldb. *Fl. Ross.* II (1844–1846) 280, ex p. — *Spielmannia* Cuss. ex Juss. in *Dict. Sc. Nat.* LV (1828) 328. — *Grammopetalum* C.A.M. ex Claus in *Beitr. Pflanzenk. Russ. Reich.* VIII (1851) 103. — *Trinia* subgenus Ev - *Trinia* Drude in *E.-P. Pflanzenfam.* III, 8 (1898) 183.

Plant dioecious or dioecious-polygamous; calyx-teeth inconspicuous; petals with inward tip, more or less colored in middle part; stylopodium conical or appressed-conical, sometimes with undulant margin. Fruit broadly ovoid or oblong, rarely subglobular, slightly compressed laterally, glabrous or with rough hairs, with flat carpophore bifurcated to base; main ribs thickish, projecting, obtuse or acute; canals in main ribs, single, large, occupying a large part of the ribs; valliculae without canals, sometimes with few small ones which often become obsolete. Perennial or biennial plants, with dioecious or dioecious-polygamous or staminate flowers, these less developed than the pistillate; stems usually profusely branching, with strongly dissected leaves and very narrow lobes of the last order.

A Mediterranean genus; 8 of its 12 species grow in the USSR.

- | | | |
|----|--|---|
| 1. | Involucels of 4–6 leaflets | 2. |
| + | Involucels absent | 5. |
| 2. | Fruit bristly-scabrous | 6. <i>T. muricata</i> Godet. |
| + | Fruit smooth | 3. |
| 3. | Umbellets 15–17-flowered; pedicels thickening in fruit; only part of the flowers develop fruits (southern coast of Crimea) | 8. <i>T. kitaibelii</i> M. B. (s. str.) |
| + | Umbellets 5–10-flowered, pistillate flowers nearly all fertile; pedicels not thickening in fruit | 4. |
| 4. | Fruit blackish, shiny, ca. 2 mm long, mericarps with 5 acute thin ribs | 2. <i>T. ucrainica</i> Schischk. |
| + | Fruit olive-colored, dull, ca. 3 mm long, mericarps with 5 obtuse ribs (Siberia) | 1. <i>T. polyclada</i> Schischk. |

* Named for Karl Bernhard Trinius, member of the Russian Academy of Sciences and noted student of grasses, who died in St. Petersburg in 1844.

- 5. Fruit scabrous-hairy 5. *T. hispida* Hoffm.
- + Fruit glabrous, smooth 6.
- 6. Mericarps with 5 winged acute ribs; pedicels thickening in fruit
- + Mericarps with 5 obtuse thickish ribs; pedicels not thickening in fruit 7. *T. leiogona* (C. A. M.) B. Fedtsch.
- 7. Terminal leaf lobes linear, 0.5–2 cm long, ca. 1 mm wide; fertile flowers 1–4 per umbellet (Crimea) 4. *T. stankovii* Schischk.
- + Terminal leaf lobes filiform, 2–7 cm long, 0.2–0.5 mm wide; fertile flowers usually 3–5 per umbel (S. European part of USSR)
- 3. *T. multicaulis* (Poir.) Schischk.

Subgenus 1. *Eutrinia* (Baill.) Drude in E. u. P. Pflanzenfam. III, 8 (1898) 189. — *Apinella* (*Eutrinia*) Baill. Hist. pl. VII (1880) 223. — *Apinella* Caruel in Parlat. Fl. ital. VIII (1889) 502. — *Apinella* sect. I *Trinia* Halacsy, Consp. Fl. Graec. I (1901) 674. — *Trinia* sect. I *Eutrinia* Drude ex Wolff in Engl. Pflanzenr. IV, 228 (1910) 180. — Fruit ovoid-elliptic, smooth or with short bristly hairs, mericarps with thickish protruding obtuse or acute ribs.

Section 1. *LEPTOPUS* Schischk. sect. nov. in Addenda XV, 430. — Pedicels filiform; fruit 2–3 mm long.

Series 1. *Polycladae* Schischk. — Involucels always of 4–6 leaflets; fruit glabrous.

- 351 1. *T. polyclada* Schischk. nom. nov. — *T. ramosissima* Ldb. Fl. alt. I (1829) 357, non Fisch. (1819). — *T. kitaibelii* Ldb. Fl. Ross. II, 243, non M. B. — *T. lessingii* Kryl. in Fl. Zap. Sib. VIII (1935) 2074, non Rchb.

Perennial; root thick, its neck densely covered with dark brown, fibrous, leaf remnants; stem 15–40 cm high, erect, thinly sulcate, often violet-colored, glabrous, branching from base with obliquely antrorse, partly spreading branches; radical leaves numerous, oblong, 8–12 cm long, ca. 3 cm wide, bi- or nearly tripinnatisect, the petioles tapering to oblong sheath, terminal lobes narrowly linear, 2–3 cm long, 0.3–0.5 mm wide, acute; cauline leaves similar, upper leaves sessile on expanded sheaths with scarious margin. Umbels 2–4 cm across, of 3–9 thin glabrous rays; involucre absent or 1–2-leaved; leaflets caducous; pistillate umbels 5–10-flowered; pedicels unequal, not thickening in fruit, 3–4 times as long as ripe fruit; involucels of 4–5 narrowly lanceolate, nearly scarious leaflets several times shorter than umbellet rays; fruit dull, glabrous, broadly ovoid, 2.5–3 mm long, 1.5–2(2.5) mm wide, mericarps with 5 thick obtuse ribs; stylopodium short-conical; styles recurved, 2–2.5 times as long as stylopodium. May–June.

Sheep's fescue slopes, shrubs, steppe meadows, sometimes solonchik. — W. Siberia: Irtysh, Alt.; Centr. Asia: Balkh (N.), Dzu-Tarb. (Tarbagatai), Endemic. Described from Malo-Krasnoyarsk. Type in Leningrad.

2. *T. ucrainica* Schischk. sp. nov. in Bot. Mat. Gerb. Bot. Inst. AN, XIII (1950) 158. — *T. hoffmannii* Schmalh., Fl. I, 388, non M. B.

Perennial; root vertical, thickened; stem 40–80 cm high, branching nearly from base or middle, ribbed, slightly violet, glabrous; radical leaves oblong, 10–20 cm long, bipinnatisect; their petioles expanding at base, shorter than blade; terminal lobes subfiliform, 10–25 mm long, short-mucronate; cauline leaves similar, upper leaves smaller. Umbels of 5–7, 5–12 mm long rays; involucre absent or of 1 narrowly linear leaflet; umbellets 4–7-flowered, the pedicels 0.5–2.5 mm long elongating in fruit to 3–6 mm, not thickening; involucels of 4–6 linear leaflets; petals broadly ovate, 0.5–0.75 mm long; fruit 2.5 mm long, ovoid, glabrous, dark colored, shiny. Fl. May–June, Fr. July.

Steppe plains, meadows, steppe slopes, forest edges. — European part: M. Dnp., Bes., U. Dns., Bl., L. Don, V.-Don (S.). Endemic? Described from Yampol. Type in Leningrad.

Series 2. *Multicaules* Schischk. — Involucels absent; fruit glabrous.

3. *T. multicaulis* (Poir.) Schischk. comb. nov. — *T. Henningii* Hoffm. Gen. Umbell. ed. 2 (1816) 94; M. B. Fl. taur.-cauc. III, 245; Ldb. Fl. Ross. II, 243; Schmal'g., Fl. I, 388; Voron. in Fl. Yugo-Vost. V, 783; Wolff in Engl. Pflanzenr. IV, 228 (1910) 184. — *T. ramosissima* Fisch. ex Koch, Pl. Umbell. dispos. (1824) 127. — *Pimpinella multicaulis* Poir. in Lam. Encycl. meth. Suppl. I (1810) 684. — ? *P. ramosissima* Fisch. ex Trevir, Ind. sem. Horti Vratisl. (1819) 3. — Ic.: Pflanzenr. IV, 228 (1910) f. 24, A–D, ad pag. 183.

Perennial; root vertical or ascending, thickened above, its neck covered with leaf remnants; stems 15–40 cm high, few, pyramidally branching nearly from base, glabrous; leaves triangular-ovate, twice or simple pinnate, the petioles expanding to sheath embracing stem; rachis and lateral leaves acutely scabrous; terminal lobes narrowly linear, 0.5–1 mm long, 0.5–1 mm wide, often with inward rolled margins, mucronate. Terminal umbels of 7–13 rays, with 1 scarious, linear or linear-lanceolate, readily deciduous involucre leaflet; umbellets of 5–11 rays, involucels absent; petals with white margins, the median brownish, oblong-linear; fruit 2.5–3 mm long, ca. 2 mm wide, on elongate thin pedicels. Fl. May–June, Fr. July–August. (Plate XXXIV, Figure 2.)

Slopes of ravines, virgin steppes, limestones and stony places, shrubs, fallows, and along railroad beds. — European part: M. Dnp., V.-Don, Bes., Bl., L. Don, V.-Kama, Transv. Gen. distr.: Centr. Eur. Described from Siberia.* Type in France.

* At the beginning of the 19th century, Siberia was thought to include the eastern regions of European Russia.



PLATE XXIV. 1- *Trinia kitaibelii* M.B.; 2- *T. multicaulis* (Poir.) Schischk.

4. *T. stankovii* Schischk. sp. nov. in Bot. mat. Gerb. Bot. Inst. AN, XIII (1950) 159.— *T. hoffmanni* et *T. glauca* auct. fl. taur.

35 Perennial; entire plant glabrous; root fusiform to turnip-shaped, its neck densely covered with brown fibrous leaf remnants; stem 20–60 cm high, angular-ribbed, erect, branching from base, the lower branches nearly reaching height of main stem; radical leaves 5–20 mm long, 0.5–1 mm wide, the petioles slightly shorter than blade, expanding below, bipinnatisect, with linear terminal lobes, short-mucronate. Umbels usually of 5, slightly unequal rays; involucre absent; umbellets many-rayed, only 2–7, thin, not thickening, 3–6 mm long rays bearing fruit; involucels absent or of 1 leaflet; fruit ovoid, 2.5–3 mm long, becoming black, with obtuse ribs; stylopodium conical; styles recurved, twice as long as stylopodium. Fl. May–June, Fr. July.

Steppes, stony slopes, openings in pine forests.— European part: Crim. Endemic. Described from Salamlyar Mountain. Type in Leningrad.

Section 2. *PACHYPUS* Schischk. sect. nov. in Addenda XV, 431.— Pedicels thickening in fruit, fruit 4–5 mm long.

Series 1. *Hispidae* Schischk.— Fruit covered with short stiff hairs.

5. *T. hispida* Hoffm. Umbell. I (1814) 94; Tellung in Hegi, Illustr. Fl. Deutschl. V, 2 (1926) 1132.— *T. henningii* M. B. Fl. taur.-cauc. III (1819) 247; Shmal'g., Fl. I, 388; Wolff in Engl. Pflanzenr. IV, 228 (1910) 185; Grossg., Fl. Kavk. III, 1525.— *Rumia leiogona* Ldb. Fl. Ross. II, 281, ex p. non C.A.M.— *R. leiogona* var. *hispida* Claus in Göbel. Reise, II (1838) 275.— *Pimpinella dioica* Pall. ex M. B. Fl. taur.-cauc. I, 242, non L.— *P. dioica rossica* Fisch. Cat. Hort. Gorenk. (1812) 44.— *P. dioica* β . *glabra* et γ . *hispida* Henning in Mem. Soc. Nat. Mosc. VI (1823) 84.— *Grammopetalum hoffmanni* C.A.M. ex Claus in Beitr. Pflanzenk. Russ. Reich. VIII (1851) 103.—? *Selinum hoffmanni* Krause in Sturm's Deutschl. Fl. ed. 2, XII (1904) 53.— *Apinella hispida* Calest. in Webbia, I (1905) 145.— Exs.: Herb. Fl. Reipubl. Ucr. No. 78.

56 Perennial; entire plant more or less scabrous-hairy or subglabrous (var. *glabra* (Henning) Thell.); stem 15–20 cm high, thickish, angular, branching from base with antrorse branches; radical leaves 10–20 cm long, bi- or tripinnate, the petioles usually shorter than blade, blade triangular-oblong with scarious margin, expanding below; primary lobes on more or less long petioles, terminal lobes linear, ca. 10 mm long, with short mucro; median and upper leaves smaller on short petioles. Umbels of 4–10 slightly unequal, scabrous rays; involucre and involucels absent; umbellets 9–20-flowered, 4–6 mm across; pedicels in fruit unequal, some 1–2, others to 4 mm, long, more or less scabrous-hairy; fruit broadly ovoid, 3–4 mm long, 2.5–3 mm wide, nearly always covered with short stiff hairs; stylopodium short-conical; styles recurved, 2–3 times as long as stylopodium. June–July.

Virgin steppes, herbaceous and stony slopes, clayey ravines, limestones and fallows. — European part: Bl., L. Don, L. V., Transv., Crim.; Caucasus: Cisc., Dag., W. Transc. (Novorossiisk); W. Siberia: U. Tob. (SW); Centr. Asia: Ar.-Casp. Endemic. Described from Krasnoarmeisk (Sarepta). Type in Leningrad.

Series 2. *Muricatae* Schischk. — Involucels present; fruit bristly-scabrous.

6. *T. muricata* Godet, Flora du Jura, I (1852) 271, in nota. — *T. lessingii* Rchb. Ic. Fl. Germ. XXI (1867) 8; Korzh. in Zapisk. Ak. Nauk po fiz.-mat. otd. VII, 1 (1898) 167; Wolff in Engl. Pflanzenr. IV, 228 (1910) 187; Voron. in Fl. Yugo-Vost. V, 184. — *T. Kitaibelii* Ldb. Fl. Ross. II (1844–46) 243, p. p. — *T. kitaibelii* Shmal'g., Fl. I, 388, p. minima p. — *Grammopetalum ledebourii* C.A.M. ex Meinsh. in Linnaea, XXX (1860) 514, nom. nud. — *T. guberlinskensis* Less. et *T. tuberculata* Turcz. in Gerb. Bot. Inst. AN. — Ic.: Fl. Yugo-Vost. V, fig. 515; Rchb. l. c. tab. 31, f.

Perennial; stems 10–35 cm high, branching nearly from base, glabrous, ribbed; leaves broadly ovate, grayish-green, bi- or tripinnate, 5–10 cm long, with linear or filiform-linear lobes 1.5–4 cm long, 0.5–1 mm wide, the petioles short, expanded, semi-amplexicaul, with white-membranous margin; upper leaves shorter, less compound. Umbels numerous, 3–4 cm across, of thin unequal rays; involucre of 1–2 linear, acute leaflets with scabrous margin; involucels of 4–6 (mostly 5) linear-subulate leaflets; umbellets 5–6 mm across, small, with staminate flowers, the pistillate larger; petals whitish, oblong-elliptic, 1 mm long, 0.5 mm wide; fruit broadly ovoid, 4–5 mm long, 2.5–3 mm wide, bristly-hairy or subglabrous; stylopodium short-conical; styles divergent, becoming recurved, twice as long as stylopodium. June.

357 Feathergrass, feathergrass-sheep's fescue, feather-grass-shrubs and solonetzic steppes, stony slopes, chalks. — European part: V.-Kama, Transv.; W. Siberia: U. Tob. (SW); Centr. Asia: Ar.-Casp. Endemic. Described from Chkalov (Orenburg). Type in France.

Series 2. *Leiogonae* Schischk. — Fruit glabrous.

7. *T. leiogona* (C.A.M.) B. Fedtsch. in Rast. Turkest. (1915) 608. — *T. hofmanni* Boiss. Fl. or. II, 833, non M. B.; Grossg., Fl. Kavk. III, 152. —? *Pimpinella dioica* M. B. Fl. taur.-cauc. I, 242, non L. — *Rumia leiogona* C.A.M. Verzeichn. Pfl. Cauc. (1831) 125; Ldb. Fl. Ross. II, 281, p. min. p. — *Apinella hoffmannii* Calest. in Webbia, I (1905) 145.

Perennial; root tuberiform or fusiform-thickened; stem single, 10–50 cm high, branching from base, branches oblique antrorse, shorter than main stem, stem like leaves very short scabrous-hairy or glabrous; leaves generally ovate-oblong, 10–12 cm long, 5–6 cm wide, tripinnatisect, the petioles shorter than blades; terminal lobes linear, 3–6 mm long, 0.5–1 mm wide,

acute or short-mucronate; median and upper leaves smaller, their petioles shorter. Umbels 1–2 cm across, of 5–7 unequal, glabrous rays; involucre and involucels absent; umbellets 7–11-flowered; petals whitish- or violet-greenish, ca. 0.5 mm long, ovate, with acute inward curved tip; fruit 4 mm long, 2–2.5 mm wide, on very unequal thickened peduncles, 1–17 mm long; stylopodium short-conical; styles recurved, 3–4 times as long as stylopodium. Fl. May, Fr. July–August. (Plate XXV, Figure 1.)

Dry stony slopes, shrubs, mainly in mountainous part of Main Range. – Caucasus: Dag., E. and S. Transc., Tal. Endemic. Described from Talysh (mountains). Type in Leningrad.

8. *T. kitaibelii* M. B. Fl. taur.-cauc. III (1819) 246, s. str. quo ad plant. taur.-? *Pimpinella dichotoma* Spreng. Syst. veg. I (1825) 883. – *P. kitaibelii* Ten. Sylloge (1831) 153, quoad nom. – *Apium kitaibelii* Jessen, Deutsch. Excursionsfl. (1879) 190, quoad nom.

Perennial; root vertical or ascending, thickened, turniplike; stem 15–40 cm high, branching from base or middle, often like branches violet, glabrous; radical leaves narrowly or lanceolate-oblong, 7–10 cm long, bipinnatisect, the petioles as long as or longer than blade, expanding to sheath; terminal lobes narrowly linear, 10–15 mm long, obtuse or acute, with short mucro; cauline leaves similar to radical, smaller, on shorter petioles. Umbels of 4–7 capilliform, nearly equal, ca. 1 cm long rays; 358 involucre absent; umbellets 15–17-flowered; pedicels 0.5–2 mm long; general involucre of 5 linear or subulate leaflets; petals broadly ovate-oblong, 0.5–0.7 mm long; only part of flowers fertile; fruiting umbellets of 3–7 unequal thickish rays, the longest 5 mm; fruit ovoid, 4 mm long. Fl. June, Fr. July. (Plate XXIV, Figure 1.)

Stony slopes. – European part: Crim. (southern coast). Endemic. Described from the Crimea. Type in Leningrad.

Note. In "Fl. taur.-cauc." (l. c.), M. Bieberstein reports for his species two localities, in the Crimea and Kremenets Volyn, on the same sheet. In the Bieberstein herbarium, two different plants on a single sheet are referred to this species. Since the description fits the Crimean plant, we retain Bieberstein's name, referring the Kremenets specimens to the newly established *T. ucrainica* m.

Genus 990. **RUMIA** * Hoffm.

Hoffm. Gen. Umbell. ed. 2 (1816) 171. – *Trinia* subg. *Rumia* Drude in E.-P. Pflanzenfam. III, 8 (1898) 183

Flowers unisexual, dioecious or polygamous; calyx-teeth inconspicuous; fruit subglobose; stylopodium short-conical; styles divergent in fruit, stigma capitate; mericarps with thick, spongy, sinuate-plicate ribs and solitary canals in valliculae. Biennial or perennial plants, with bipinnatisect leaves and linear lobes.

Monotypic genus common on the southern coast of the Crimea.

* After Karl-Georg Rumi (born 1780), professor of law and librarian in Hron (Tatra Mountains).



PLATE XXV. 1—*Trinia leiogona* (C.A.M.) B. Fedtsch.; 2—*Rumia crithmifolia* (Willd.) K.-Pol.

1. *R. crithmifolia* (Willd.) K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 173. — *R. taurica* Hoffm. Gen. Umbell. ed. 2 (1816) 173; DC. Prodr. IV, 98; Ldb. Fl. Ross. II, 280. — *Sanicula crithmifolia* Willd. in Neue Schrift. d. Ges. Naturf. Freund. in Berlin, III (1801) 419. — *Artemisia squamata* Pall. in Ind. taur. (1797) 308, nom. nud. et in N. Acta Acad. Petropol. X (1798) 308, non L. — *Cachrys taurica* M. B. Fl. taur.-cauc. I (1808) 218; III, 217, non Willd. (1798). — *Trinia taurica* Schmalh., Fl. Sr. i Yuzhn. Ross. I (1895) 389; Drude in E.-P. Pflanzenfam. III, 8 (1898) 183. — *T. crithmifolia* Wolff in 361 Engl. Pflanzenr. IV, 228 (1910) 190. — Ic.: Hoffm. l. c. tab. in tit. f. 3, 4, 17, 21. — Exs.: Dörf. Herb. norm. No. 3422.

Perennial; entire plant glabrous; root to 1 cm thick, vertical or ascending, its neck covered with pale fibrous leaf remnants; stem 15–50 cm high, more or less erect, branching nearly from base with long alternate (rarely opposite), obliquely ascending branches; radical leaves numerous, triangular, bipinnatisect into narrowly linear, 1–3 cm long, ca. 1 mm wide acute lobules; cauline leaves smaller, nearly simple-pinnate, with slightly shorter lobules. Umbels 1–4 cm across, of 2–11 glabrous rays; involucre absent; involucels of 5 lanceolate-linear, acute, herbaceous leaflets with scarious margin, nearly as long as umbellets; umbellets 3–5-flowered; pedicels short; flowers unisexual, dioecious or polygamous; calyx-teeth inconspicuous; fruit subglobose, ca. 4–5 mm long, nearly as wide; stylopodium short-conical; styles straight, divergent; stigma capitate. June–July. (Table XXV, Figure 2, Table XXX, Figure 3.)

Open stony slopes, frequent on limestones. — European part: Crim. Endemic. Described from the Crimea. Type was in Berlin.

Genus 991. **LEDEBOURIELLA** * Wolff

Wolff in Engl. Pflanzenr. IV, 228 (1910) 191. — Rumia Hoffm. Gen. Umbell. ed. 2 (1816) 171, ex p.; Ldb. Fl. Ross. II (1844–1846) 281, ex p.

Flowers polygamous; calyx-teeth distinct, very short, ovate or sublinear, thickened; petals whitish, with inward curved acute tip; stylopodium short-conical; styles recurved, twice as long as stylopodium; fruit ovoid or oblong-cylindrical, slightly compressed dorsally, not constricted at commissure; mericarps with only primary thickened "spongy" ribs, the marginal slightly dilated, bearing a row of 5–8 vesicular tubercles, mixed with slightly smaller ones; ribs contain a large single canal, valliculae with 1 canal, 2–4 toward commissure, albumen semilunate in cross section. Perennial branching herbs, with bi- or tripinnatisect leaves, involucre absent, involucels of 3–5 scarious leaflets.

Two species in South Siberia.

1. Involucels of 7–10 lanceolate-linear leaflets; umbellet with numerous flowers (20–25), umbel rays 8–20. 2. *L. multiflora* (Ldb.) Wolff.
362 + Involucels of 3–5 ovate-lanceolate leaflets; umbellet with 5–10 flowers, umbel rays 3–6(10) 1. *L. seseloides* (Hoffm.) Wolff.

* After Ledebour (1785–1851), professor of Yu'rev University, author of "Flora Altaica" (Flora of Altai) and "Flora Rossii" (Flora of Russia).

1. *L. seseloides* (Hoffm.) Wolff in Engl. Pflanzenr. IV, 228, H. 43 (1910) 192. — *Rumia seseloides* Hoffm. Gen. Umbell. ed. 2 (1816) 174, patr. excl.; DC. Prodr. IV, 98; Ldb. Fl. Ross. II, 281. — *Cachrys seselioides* M. B. Fl. taur.-cauc. III (1819) 217. — *Trinia seselioides* Ldb. Fl. alt. I (1829) 357. — *Johrenia seseloides* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 133. — Ic.: Ldb. Ic. pl. Fl. ross. I (1829) tab. 8.

Perennial; root rather thick, multicapital, its neck covered with brown leaf remnants; stems 10–40 cm high, single or few, erect, like leaves glabrous, thinly ribbed, branching, branches in bundles, the lower branching, the medium ones often nearly opposite; radical leaves smooth, 5–7 cm long, ovate-oblong or ovate, bi- or tripinnatisect, the petioles nearly equal to blade; primary lobes petioluled, lobes of the last order linear, 2–12 mm long, 0.5–1 mm wide, with glabrous margins;* cauline leaves similar to the radical, the terminal with undeveloped blades. Flowers heterogeneous; umbels 2–4 cm across, of 3–6(10) glabrous, angular, unequal rays, central rays reduced, often 1-flowered; involucre absent or of 1 linear or oval, caducous leaflet; umbellets ca. 5 mm across, 6–10-flowered; involucels of 3–5 small scarious ovate-lanceolate leaflets; calyx-teeth very small, ovate, acute; petals whitish, with acute inward tip; fruit slightly compressed dorsally, ovoid, 5 mm long, 2.5 mm wide, tuberculate-plicate along ribs; stylopodium conical; styles thickish, divergent, becoming recurved, 2–4 times as long as stylopodium, capitate. June–July. (Plate XXX, Figure 5.)

Desert slopes, dry steppes. — W. Siberia: ? Irt. Endemic. Described from Chingis-Tau Mountains. Type in Leningrad.

2. *L. multiflora* (Ldb.) Wolff in Engl. Pflanzenr. IV, 228 (1910) 191. — *Rumia multiflora* Ldb. Fl. Ross. II (1844–1846) 281. — *Cachrydium sieversii* C. A. Mey. in Herb. Leninopol. — *Johrenia sieversii* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 133.

363 Perennial; similar to preceding species but differing by higher stem, narrower leaf lobes, 0.3 to 1 mm wide, more umbel rays (10–25), many-flowered umbellets, and more numerous involucre leaflets. (Plate XXX, Figure 4.)

W. Siberia: Alt.(?). Endemic. Described from Siberia. Type in Leningrad.

Note. The delimitation of *L. multiflora* (Ldb.) Wolff presents an extremely complicated problem. Described by Ledebour after an unsatisfactory specimen in the Willdenow Herbarium, which Willdenow had called *Cachrys taurica* (Ldb. l. c.), Ledebour doubted its derivation from the Crimea, adding the query: in Tauria? In the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR there are parts of the plant, with remnants of the upper leaves. The specimen in the Stephan Herbarium, with fruiting umbels, matches the description of *Rumia multiflora* Ldb. On the label of *Cachrys microcarpa taurica*, *taurica* has been crossed out and *sibirica*! ex *Sibiria* Stev... inserted. K. Meyer added in pencil "*Cachrydium Sieversii* C. A. Mey." Kozo-Polyanskii identified this specimen with *Trinia seseloides* Ldb. and *Rumia seseloides* Hoffm. and transferred Meyer's name to another genus — *Johrenia sieversii* K.-Pol.

* It is incomprehensible why Ledebour (l. c.) originally described the leaf-margins as scabrous, whereas the leaves of the type specimens have glabrous margins, and are only occasionally rugose.

Genus 992. **ORMOPTERUM** * Schischk.

Schischk. in Addenda XV, 597

Calyx-teeth inconspicuous; petals white, ovate, acute, recurved after flowering; fruit oblong; stylopodium short-conical, with broadened undulant base; styles thickish, recurved; stigma capitate; mericarps with 5 equal ribs covered with transverse folds. Biennial plants with tuber, tripinnatisect leaves, involucre and involucels.

Monotypic genus common to Turkmenia.

1. *O. turcomanicum* (Korov.) Schischk. comb. nov. — *Hyalolaena turcomanica* Korov. in Bot. mat. Gerb. Inst. bot. i zool. Ak. Nauk UzSSR, XII (1948) 21. — Exs.: Sintenis, Iter transc.-pers. 1900–1901, No. 299.

364 Biennial; entire plant glaucescent; root tuberous, often lobate; stem 85–100 cm high, erect, with narrow white stripes, branching from middle or nearly from base with long thin, oblique antrorse branches; radical leaves soon withering, oblong-ovate, 10–15 cm long, 3–5 cm wide, tripinnatisect, the petioles shorter than the blade; primary lobes sessile, lobules of the last order linear, 1.5–5 mm long, 0.2–0.5 mm wide, short mucronate; cauline leaves similar to the radical; the upper small, simple-pinnate. Umbels 2–4 cm across, of 4–8 unequal glabrous rays; involucre of 5 ovate-lanceolate, acute leaflets with broad scarious ciliate margin, much shorter than umbel rays; umbellets 5–6 mm across, 10–15-flowered; leaflets of involucels 5, completely concealing umbellets prior to flowering, elliptic, nearly entirely scarious, with ciliate margin; calyx-teeth inconspicuous; petals white, ovate, acute, 1.5 mm long, recurved after flowering; stylopodium short-conical, with broadened undulant base; styles recurved, thickish, longer than stylopodium, stigma capitate; fruit oblong, 4 mm long, 1.5 mm wide. May. (Plate XXX, Figure 6, 6a.)

Sandy hills, fixed barkhans. — Centr. Asia: Mtn. Turkm., Kara K. Endemic. Described from Badkhyz. Type in Tashkent.

Genus 993. **SZOVITSIA** ** Fisch. et Mey.

Fisch. et Mey. in Ind. I sem. Horti Petrop. (1835) 39

Flowers bisexual; calyx with 5 inconspicuous teeth; petals obovate, not notched, with inward curved ligule; fruit ovoid-oblong, slightly compressed laterally; primary ribs filiform, hardly discernible, secondary ribs 4, wide, dentate, with transverse folds; stylopodium short-conical; styles recurved, 2–3 times as long as stylopodium; canals under secondary ribs solitary, narrow. Annual glabrous herbs, with bipinnatisect leaves and linear-setiform lobules.

A monotypic genus endemic to S. Transcaucasia, N. Turkish Armenia and Iran.

* From the Greek ormos — necklace, pteron — wing, referring to the unique sculpture of the fruit surface.

** After Ivan Osipovich Sovich, Odessa pharmacist who collected extensively in 1828–1830 in Armenia, Karabakh, Imeretia, Mingrelia and Iranian Azerbaidzhan.

1. *S. callicarpa* Fisch. et Mey. l. c. (1835) et in *Linnaea*, X, Litt. Ber. (1836) 103; Boiss. Fl. or. II, 855; Grossg., Fl. Kavk. III, 152. — Ic.: Baill. Hist. des plant. VII (1880) 125; K.-Pol. in Tr. Bot. Sada Yur'ev. univ. XV, 2-3 (1914) tabl. I, fig. 25; tabl. II, fig. 25; Wolff in 365 Engl. Pflanzenr. IV, 228 (1927) 20; f. 1, A, B, C. — Exs.: Pl. or. exs. No. 16.

Annual; entire plant glabrous; stem 25-60 cm high, thin, whitish or violet in lower half, erect or geniculately curved, branching from base or only in upper part; radical leaves early withering; cauline leaves broadly ovate, bipinnatisect, the petioles expanding to embrace stem, the lobules linear-setiform, 1-5 cm long, diverging at a right angle. Umbels on peduncles opposite leaves, of 4-11 antrorse rays; involucre absent; umbellets ca. 1 cm across, of 5 rays; involucels 5-6 lanceolate scarious attenuate leaflets; petals white, notched, with short-mucronate tip, peripheral petals elongating to 3 mm; fruit 4-5 mm long, 2-3 mm wide. May-June. (Plate XXX, Figures 7, 7a; Plate XXVIII, Figure 2.)

Dry stony slopes and solonchic deserts, often in wormwood associations, 1,500 m. — Caucasus: E. and S. Transc. Gen. distr.: Arm.-Kurd. (Kagyzman), Iran. Described from E. Karabakh. Type in Leningrad.

Genus 994. **APHANOPLEURA** * Boiss.

Boiss. Fl. or. II (1872) 855. — Szovitsia (Fisch. et Mey.) Drude in E.-P. Pflanzenfam. III, 8 (1898) 183, ex p. — Carum subgen. Mesocarum, sect. Tragodes, ser. Aphanopleura K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 199.

Flowers bisexual; calyx-teeth inconspicuous; petals white or pinkish, obscurely notched, with acute inward curved tip; fruit ovoid or subglobular, compressed laterally, covered with claviform or capitate hairs; mericarps with poorly developed obtuse ribs; stylopodium conical; styles recurved, twice as long as stylopodium; canals under valliculae large, solitary, 2 toward commissure; albumen pentagonal in cross section; carpophore free, entire, bifurcated above. Annuals, with entire or distally tridentate or bi-, tripinnate leaves, glabrous or soft-hairy.

Three species in the arid environments of Central Asia, S. Transcaucasus and Afghanistan.

- | | | |
|--------|--|--|
| 1. | Involucre absent or 1-2-leaved; stem glabrous | 3. <i>A. capillifolia</i> (Rgl. et Schmalh.) Lipsky. |
| + | Involucre of 4-6 leaflets; stem sometimes soft-hairy only in lower half | 2. |
| 366 2. | Umbels of 8-15 rays; leaf lobes narrowly linear, 0.5-1 mm wide, entire (Transcaucasus) | 1. <i>A. trachysperma</i> Boiss. |
| + | Umbels of 5-8(10) rays; leaf lobes lanceolate or obcuneate, 3-10 mm wide, often with 3 denticles above (Centr. Asia) | 2. <i>A. leptoclada</i> (Aitch. et Hemsl.) Lipsky. |

* From the Greek *aphanes* — obscure, *pleura* — rib.

Series 1. *Trachycarpae* Schischk. — Umbellets of 5–15 rays; involucre of 5 leaflets; plant pubescent.

1. *A. trachysperma* Boiss. Fl. or. II (1872) 855; Grossg., Fl. Kavk. III, 152. — *A. trachycarpa* Lipsky in Izv. S.-Peterb. AN, ser. V, IV (1898) 375; Wolff in Pflanzenr. IV, 228 (1927) 19. — *Ammi trachycarpum* C. A. M. nom. in sched. ad Herb. Petropol. — *Carum trachycarpum* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 199.

Annual; root thin; stem 15–50 cm high, furcately branching nearly from base with obliquely antrorse branches, shortly and densely soft-hairy in lower half, subglabrous above; radical leaves early withering, their petioles soft-hairy at base; cauline leaves bi-, tripinnate, broadly ovate, with narrowly linear, 1–3 cm long, 0.5–1 mm wide, acute lobules, with glabrous margin; upper cauline leaves smaller, sessile on expanded sheath. Umbels numerous, terminating stems and branches, 3–8 cm across, of 7–15 slightly unequal glabrous rays, spreading in fruit; involucre of 5 lanceolate, acuminate, scarious leaflets; umbellets small, 5–6 mm across; involucels of 5 ovate-lanceolate, scarious, thinly acuminate, glabrous leaflets nearly as long as umbellet rays; calyx-teeth inconspicuous; petals notched, with inward curved tip; fruit broadly ovoid, 2 mm long, 1.5 mm wide, densely covered with very short papillae. June–July.

Clayey stony slopes, solonetzic deserts to 1,000 m. — Caucasus: S. Transc. (Nakhichevan, Vagarshapat). Endemic. Described from Nakhichevan. Type in Geneva, cotype in Leningrad.

2. *A. leptoclada* (Aitch. et Hemsl.) Lipsky in Izv. S.-Peterb. AN, ser. V, IV (1898) 377. — *A. Fedtschenkoana* K.-Pol. in Bot. mat. Gerb. Gl. Bot. Sada, III, 18 (1922) 69; Wolff in Pflanzenr. IV, 228, 20. — *Carum leptocladum* Aitch. et Hemsl. in Trans. Linn. Soc. Bot. ser. II, III (1888–1889) 66. — *C. Aphanopleurae* K.-Pol., ibid. (1922) 69. — *Psammogeton glabrum* Bornm. et Sint. ex B. Fedchenko, Rast. Turk. (1915) 609, in synon. — Ic.: Aitch. et Hemsl. l. c. tab. 22; Wolff in Pflanzenr. IV (1927) 20, f. 4, D–H. — Exs.: H. F. A. M. No. 321; P. Sintenis; Pl. exs. No. 264 et 500 (sub *Psammogeton glabrum* Bornm. et Sint.). — 367

Annual; entire plant covered with soft hairs, sometimes subglabrous; stem 10–40 cm high, strongly branching from base; leaves lanceolate, oblong-lanceolate or obcuneate, gradually tapering to more or less long petiole, the blade acuminate, with 3 parallel nerves, entire or 3-partite or 3-toothed at apex; blade of median stem leaves 1.5–2 cm long, 3–10 mm wide, their petioles to 1–2 cm long, sheath not developed with scarious margin. Umbels numerous, often opposite leaves, peduncle long, 2–8 times as long as rays, rays 5–10 thin, strongly divergent, slightly curved, spreading-hairy; leaflets of involucre 2–5, lanceolate, acute, whitish, membranous, 2–3 mm long, short-hairy outside, with ciliate margin and protruding scabrous nerve; umbellets of 10 nearly equal rays; leaflets of involucels 5–6, oval-lanceolate, long-acuminate from broadly rounded base, 2.5 mm long, as long as fruiting pedicel; petals white or pinkish, from depressed median nerve, spuriously notched, with acute inward curved tip, dorsally pubescent, especially along nerve; fruit ovoid, ca. 2 mm long, 1.2 mm wide, densely covered with long claviform hairs; stylopodium conical; styles recurved; carpophore entire, apically bifurcate. Fl. April–May, Fr. June. (Plate XII, Figure 2.)

Fixed, rarely unfixed sands, sandy slopes, crops, riparian woodlands. — Centr. Asia: Amu D., Kyz. K., Mtn. Turkm. **Gen. distr.:** Afghanistan. Described from Afghanistan. Type in London.

Series 2. *Capillifoliae* Schischk. — Involucre absent or of 1 leaflet; plant glabrous, but leaves sometimes with scabrous-ciliate margins.

3. *A. capillifolia* (Rgl. et Schmalh.) Lipsky in Izv. AN, ser. V, IV (1898) 379; Wolff in Pflanzenr. IV, 228 (1927) 21. — *Pimpinella capillifolia* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestv. antrop. i etnogr. XXXIV, 2 (1881) 29. — *Carum capillifolium* K.-Pol. in Izv. Mosk. obshch. estestv. n. s. XXIX (1915) 199. — Exs.: G. R. F. No. 970; H. F. A. M. No. 320.

Annual; root thin; stem 7–12 cm high, glabrous, violet in lower half, with oblique antrorse, sometimes horizontally spreading branches from middle up; radical leaves early withering; cauline leaves bipinnate, with 368 few linear or narrowly lanceolate-linear lobes of the last order, with glabrous or ciliate-scabrous margin, acute, 5–10 mm long, ca. 1–2 mm wide; their petioles longer than blade, expanding to sheath with scarious margin; upper leaves less dissected, their lobes narrower, sometimes subfiliform. Umbels terminating stem and branches, 1.5–2.5 cm across, of 3–6 smooth rays; involucre absent or of 1 linear, nearly entire, scarious leaflet; umbellets small, 4–5 mm across; involucels of 4–6 lanceolate or linear-lanceolate thinly acuminate leaflets sometimes with ciliate margin, shorter than umbellet rays; calyx-teeth inconspicuous; petals white or pink-violet, notched or truncate, with inward tip and sharply protruding median nerve; fruit broadly ovoid, 1.2 mm long, 1 mm wide; mericarps indistinctly ribbed; covered with remote claviform bristles. April–June.

Clayey slopes, sandy deserts. — Centr. Asia: Balkh. (Ili River), T. Sh. (W.), Syr D., Amu D., Pam.-Al., Mtn. Turkm., Kara K., Kyz. K. Endemic. Described from the rivers Chulakh and Zeravshan, in the desert between Syr-Darya and Tashkent. Type in Leningrad.

Genus 995. **FRORIEPIA** * C. Koch

C. Koch in Linnaea, XVI (1842) 362

Calyx-teeth inconspicuous; petals white, subrounded, notched; fruit ovoid, compressed laterally, with 5 primary and 4 secondary filiform ribs; stylopodium short-conical; styles much shorter than stylopodium, recurved; canals absent; carpophore apically divided. Biennial herb with small umbels and umbellets, involucre and involucels present.

Monotypic genus, Caucasus and Iran.

1. *F. subpinnata* (Ldb.) Baill. Hist. Pl. VII (1880) 220; Wolff in Pflanzenr. IV, 228 (1927) 22; Grossg., Fl. Kavk. III, 153. — *F. nuda* C. Koch in Linnaea, XVI (1842) 362; Ldb. Fl. Ross. II, 334; Boiss. Fl. or. II, 857. — *Bupleurum subpinnatum* Ldb. in Eichw. Casp.-Cauc.

* Named after Froriep, physician and naturalist.

(1831) 13. — *Petroselinum segetum* Ldb. Fl. Ross. II (1844) 242, non Koch. — Ic.: Ldb. in Eichw. l. c. tab. 11. — Exs.: Herb. Fl. Cauc. No. 91.

Annual; entire plant glabrous; root vertical, 3–5 mm thick; stems 50–100 cm high, single or few, cylindrical, thinly ribbed, branching from base, with long antrorse branches; radical leaves narrowly oblong, 369 6–20 cm long, 1–3 cm wide, simple-pinnate, short-petioled; lobes ovate, 5–15 mm long, 4–10 mm wide, acute, incised-dentate, sessile, truncate at base; cauline leaves similar, smaller. Umbels of 3–4 smooth, ribbed, extremely unequal rays; involucre and involucels of 3–5 oblong-lanceolate leaflets with broad scarious margin; umbellets 3–7-flowered, on very unequal pedicels; median flowers subsessile; calyx-teeth inconspicuous; petals white or greenish-white, 0.5–0.6 mm long, subrounded, notched; fruit 2.5 mm long, 1.8 mm wide. June–July. (Plate XXX, Figure 8.)

Fields, roadsides, dwellings, meadows, gardens, forest edges. — Caucasus: Cisc., Dag., W., E. and S. Transc., Tal. Gen. distr.: Iran. Described from the Samur River near Derbent. Type in Leningrad.

Genus 996. **CUMINUM** * L.

L. Sp. pl. (1753) 254. — Cummin Hill. Veg. Syst. VI (1764) 7. — Cuminia J.F. Gmel. Syst. (1791) 309. — Cyminum Hill, A Decade of trees and plants Brit. Herb. (1756) 422. — Cyminon St. Lager in Ann. Soc. Bot. Lyon, VII (1880) 65. — Luerssenia O. Kuntze, Rev. Gener. (1891) 268. — Cuminum L. emend. sect. II Cuminum l. Karrabadion K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 208.

Calyx-teeth conspicuous, elongate; petals white or red, oblong, deeply notched, with long inward curved tip; fruit oblong, tapering above and below, slightly flattened laterally, constricted along commissure, not separating easily; mericarps with 5 filiform primary ribs bearing short bristles, valliculae with 1 riblike protruding stria with crowded long stellate bristles; canals single under valliculae, 2 toward commissure; endosperm slightly incised toward commissure. Annual or biennial (?) plant, with bifurcate-ternate dissected leaves and thin linear lobules; involucre and involucels present.

Two species, southern Mediterranean area, Central Asia and Sudan.

1. *C. cyminum* L. Sp. pl. (1753) 254; DC. Prodr. IV, 201; Boiss. Fl. or. II, 1079; B. Fedch., Rastit. Turkest. (1915) 609. — *C. officinale* Garsault, Fig. Pl. et Anim. d'usage Med. II (1764) tab. 239. — *C. odorum* Salisb. Prodr. (1796) 165. — *C. hispanicum* Bge. in Mém. sav. étr. VII (1851) 312, non Merat. — *Ligusticum cuminum* Crantz, Cl. Umbell. emend. (1767) 82. — *Cuminia cyminum* J. F. Gmel. Syst. (1791) 484. — *Cyminon longeinvolutum* St. Lager in 370 Ann. Soc. bot. Lyon, VII (1880) 65. — *Luerssenia cyminum* O. Kuntze, Rev. gen. (1891) 268. — *Selinum cuminum* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 91. — Ic.: Hegi, Illustr. Fl. V, 2, Fig. 2424.

* *Cuminum* — ancient Roman name of the plant, from the Greek *kuminon*, apparently derived from the Babylonian *ka-mu-nu*.

Annual, biennial; entire plant (except for fruit) glabrous, 10–50 cm high, furcately branching nearly from base; lower leaves bifurcately and ternately dissected, with thin linear lobules of the last order, 1–3 cm long, 0.3 mm wide. Umbels of 3–5 glabrous rays; involucre and involucels mostly longer than rays of umbels and umbellets; involucre often 3-partite; calyx-teeth elongate, subulate; petals white or red, oblong, deeply incised, with inward curved tip; styles short, becoming recurved; fruit oblong, 6 mm long, 1.5 mm wide, crowned with subulate calyx-teeth. April–May.

Oases in sandy deserts. — Centr. Asia: Kyz. K. (?), Balkh. **Gen. distr.:** southern Mediterranean area (Spain, Egypt), Sahara, Ethiopia, Marmarica. Frequently cultivated in tropical and subtropical countries. Described from Egypt and Ethiopia. Type in London.

Economic importance. This plant has been used as a spice as well as an officinal plant since antiquity. It is still in use in the production of some liqueurs and as a seasoning for cheese (Holland). In India it is one of the ingredients of curry powder. The fruits contain from 2.36 to 4% essential oil, 7.135% chlorophyll, 0.5% myricin, 7.725% oil, 16% gum, etc.

Note. Some reports in the literature point to *Cuminum cymidulum* L. being indigenous to Central Asia (Kyzyl-Kum), from where it could have spread via Southwest Asia to Egypt and Southern Europe, and especially to the Mediterranean area — Syria, Tripolitania, Malta, Morocco. It is also cultivated in N. America, Chile, India where it has locally escaped from cultivation.

Genus 997. **APIUM** * L.

L. Sp. pl. (1753) 264

Calyx-teeth inconspicuous; petals nearly pure white, with cordate base, slightly incised with inward curved tip; fruit cylindrical, slightly compressed laterally; mericarps nearly hemispherical, circular-pentagonal, in cross section, with 5 equal, slightly protruding main ribs; canals single
371 under valliculae, large, 2 toward commissure; albumen nearly flat. Herbaceous biennials (in cultivation — annuals), with trifid and pinnate leaves.

Monotypic genus, all over Europe, Southwest Asia to India, N. and S. Africa. Cultivated and locally escaped in America, New Zealand, and elsewhere.

1. *A. graveolens* L. Sp. pl. (1753) 264; Ldb. Fl. Ross. II, 242; Boiss. Fl. or. II, 506; Shmal'g., Fl. I, 392; Grossg., Fl. Kavk. III, 153. — *A. lobatum* Gilib. Fl. lithuan. II (1782) 41. — *A. Celleri* Gaertn. Fruct. I (1788) tab. 22. — *A. maritimum* Salisb. Prodr. (1796) 169. — *A. decumbens* Ecklon et Zeyher, Enum. (1834–1837) 340. — *A. vulgare* Bub. Fl. Pyren. II (1900) 344; non Lam. — *Seseli graveolens* Scop. Fl. carn. ed. 2, 1 (1772) 215. — *S. Apium* Roth, Tent. Fl. Germ. I (1788) 128. — *Sium graveolens* Vest, Man. Bot. (1805) 517. —

* From the Celtic *apon* — water, referring to its preference for damp habitats, or from the Latin *apis* — bee, as bees readily gather on it to collect nectar.

Smyrniolum laterale Thunb. Prodr. pl. Cap. (1794–1800) 51. — *Helosciadium ruta* DC. Prodr. IV (1830) 106. — *H. rutaceum* St. Lager in Ann. Soc. Bot. Lyon, VII (1880) 127. — *Celeri graveolens* Britt. in Britt. et Brown. Ill. Fl. ed. 2, II (1913) 660. — *Selinum graveolens* E. H. L. Krause in Sturm. Fl. Deutschl. III Aufl. XII (1904) 38. — *Carum graveolens* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 199. — Ic.: Syreishch. Fl. Mosk. gub. II (1907) 399.

Annual or biennial; root fusiform, branching, lignifying in second year, cultivated forms with fleshy, cylindrical-turnip-shaped root; stem erect, 30–100 cm high, furrowed, often hollow, strongly branching, with spreading branches; leaves long-petioled (petioles sometimes fleshy), the lowermost leaves trifid, becoming pinnate, resembling cauline leaves; upper cauline leaves sometimes opposite, subsessile, on short sheaths with white-scarious margins; in lower leaves first-order lobes rounded, obtuse at base, 3-lobate or tripartite, incised-dentate with acute teeth, these of cauline leaves cuculate at base, with acute whitish-cartilaginous teeth. Umbels numerous, small, on short peduncles or subsessile, of 6–12 glabrous rays; involucre and involucels none; petals white, ca. 0.5 mm long; fruit 1.5–2 mm long, nearly as wide. July–September.

Coastlines and solonchik places. Often cultivated as a vegetable. — European part: Crim., Bl., Bes., U. Dns.; Caucasus: all regions; Centr. Asia: Syr D., Pam.-Al., Mtn. Turkm. **Gen. distr.:** Centr. and Atl. Eur., Scand., Bal.-As. Min., N. and S. Afr.; cultivated and locally escaped in N. and S. America, Australia, New Zealand, and elsewhere. Described from Europe. Type in London.

Economic importance. The fresh thickened edible roots contain 84%
372 water, 0.25–0.39% oil, 0.77% sugar, 1–1.48% nitrogenous substances, 7.7–11% extractive nitrogen-free substances, about 1.5% crude fibers, and 0.84–1.46% ash. The seeds contain 2–3% essential oil (main component being lemonene, 60%), in addition to sedanolid, sedanonic anhydride acid (2–3%) and sesquiterpene-selinene (10%). The oil is comparable to high quality peppermint oil; the green parts of the plant yield about 0.1% essential oil.

Note. *Apium*, endemic to the Mediterranean region, was already cultivated by the ancient Egyptians, Greeks and Romans. In Europe it was known in the Middle Ages, but its widespread cultivation began only in the 18th century.

Genus 998. **HELOSCIADIUM*** Koch

Koch, Pl. Umbell. nov. disp. (1824) 125, ex p. — *Helodium* Dumort. Florul. belg. (1827) 77. — *Sium* sect. *Helosciadium* Gaud. Fl. helv. II (1828) 430. — *Apium* sect. *Helosciadium* Babingt. Man. brit. bot. ed. 8 (1881) 156. — *Apium* subgen. *Helosciadium* Drude in E.-P. Pflanzenfam. III, 8 (1898) 185

Calyx-teeth inconspicuous; petals white, ovate, acuminate, with inward curved tip; fruit ovoid or broadly so, glabrous or smooth; mericarps with 3 protruding dorsal and 2 marginal ribs; carpophore free, entire. Herbs,

* From the Greek *helos* — swamp, *skias* — umbrella.

swamps, with simple-pinnate dentate leaves and the lateral umbels on short (rarely long) pedicels or subsessile; involucre absent.

Five species in C. Europe and the Mediterranean region, one in S. Africa.

1. *H. nodiflorum* (L.) Koch, Pl. Umbell. nov. disp. (1824) 125; Ldb. Fl. Ross. II, 244; Boiss. Fl. or. II, 856.— *Sium nodiflorum* L. Sp. pl. (1753) 251.— *Cicuta nodiflora* Crantz, Cl. Umbell. (1767) 97.— *Seseli nodiflorum* Scop. Fl. carn. ed. 2, I (1772) 213.— *Sison nodiflorum* Brot. Fl. Lusit. I (1804) 423.— *Pimpinella nodiflora* Stokes, Bot. Mat. Med. II (1812) 149.— *Tordylium cyrenaicum* Spreng. Syst. veg. I (1825) 895.— *Helodium nodiflorum* Dumort. Florul. belg. (1827) 77.— *Apium nodiflorum* Rchb. f. Ic. fl. Germ. et helv. XXI (1867) 10; Grossg., Fl. Kavk. III, 153.— *Selinum nodiflorum* E. H. L. Krause in Sturm, Deutschl. Fl. 2 Aufl. XII (1904) 34.— Ic.: Rchb. l. c. tab. 15, f. 1856.— Exs.: G. R. F. No. 332.

Perennial; rhizome short, with dense long thin roots; stem (10)20–40 cm high, simple or ascending at base, like leaves glabrous, more or less branching, sulcate, usually hollow inside; radical and lower cauline leaves long-petioled, oblong, 10–20 cm long, 3–5 cm wide, simple-pinnate; leaflets 3–6 pairs sessile or more or less spreading, broadly ovate, sometimes subrounded, 0.8–2.5 cm long, 0.5–1.5 cm wide, acute with rounded-dentate margins, teeth with short, often antrorse mucro; petioles expanding at base to oblong sheath auricularly broadening above; uppermost leaves smaller, their petioles shorter. Umbels numerous, small, 1–2 cm across, on short peduncles, sometimes subsessile, of 5–7 unequal glabrous rays; involucre absent; umbellets 5–7 mm across; involucels of 5 unequal, ovate-lanceolate, acuminate leaflets with narrow white-scarious margin, often exceeding umbellets; petals white, ca. 0.5 mm long, broadly ovate, cordate at base, with very short inward curved tip, nearly not notched; fruit 1.5–2 mm long and nearly as wide; mericarps with 5 equal acute primary ribs. Fl. May–June, Fr. June–July. (Plate XXX, Figure 9.)

Banks of streams, riparian woodland thickets, inundated areas.— Centr. Asia: Syr D., Amu D., Pam.-Al., Mtn. Turkm. Gen. distr.: Centr. and Atl. Eur., Med., N. Afr., Bal.-As. Min., Iran., introduced into N. and S. Am. (Chile). Described from Europe. Type in London.

Genus 999. **PETROSELINUM*** Hoffm.

Hoffm. Gen. pl. Umbell. ed. 2 (1816) 78.— *Apium* L. Sp. pl. (1753) 264, ex p.— *Wydleria* DC. Coll. mém. Fam. Ombell. (1829) 36.— *Anisactis* Dulac, Fl. Hautes Pyr. (1867) 347.— *Carum* I *Petroselinum* Benth. in Benth. et Hook. Gen. Pl. I (1867) 891.— *Apium* sect. II *Petroselinum* Calest. in Webbia, I (1905) 174.— *Pimpinella* § 5 *Apium* O. Ktze. in Post et O. Ktze. Lex. gen. phaner. (1904) 139, ex. p.

Calyx-teeth inconspicuous; petals yellow-green or whitish, often with reddish tinge, cordate at base, notched, with long inward curved lobe; stylopodium short-conical; stigma capitate; fruit ovoid, slightly compressed laterally, rounded or obscurely cordate at base, slightly constricted

* Greek petroselinon, Dioscorides' name for parsley, from the Greek petros — stone, rock; sélinon — wreath, referring to the use of the plant in the making of wreaths.

along commissure, appearing geminate; mericarps with 5 filiform ribs, canals single under valliculae, 2 toward commissure. Albumen flat. Biennial, rarely annual herbs, with 2–3 pinnate leaves and yellowish-green or whitish petals.

Three species in W. and S. Europe, of which 1 universally cultivated.

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1. *P. crispum* (Mill.) Nym. Consp. Fl. europ. (1879) 309, pro syn. — *P. hortense* Hoffm. Gen. pl. Umbell. ed. 2 (1816) 163, nom. nud.; Voron. in Fl. Yugo-Vost. V, 985. — *P. hortense* var. *crispum* Bailey, Man. Cult. Pl. (1924) 564; Wolff in Engl. Pflanzenr. IV, 228 (1927) 63. — *P. sativum* Hoffm. l. c. (1816) 178, in indice; Boiss. Fl. or. II, 857; Shmal'g., Fl. I, 392. — *P. sativum* var. *crispum* Gaud. Fl. Helv. II (1828) 423; DC. Prodr. IV (1830) 102. — *P. sativum* subvar. *crispum* Coss. et Germ. Fl. Env. Paris, ed. 2 (1861) 254. — *P. sativum* var. *vulgare* Alef. Landwirtsch. Fl. (1866) 152. — *P. vulgare* S. F. Gray, Nat. Arr. Brit. Pl. II (1821) 524. — *P. romanum* Sweet, Hort. brit. ed. 2 (1830) 245, exp. —? *P. Thoermeri* Weinm. in Bull. Soc. Nat. Mosc. VII (1837) 60; Ldb. Fl. Ross. II, 242; Wolff in Engl. Pflanzenr. IV, 228 (1927) 68. — *P. petroselinum* Karst. Fl. Deutschl. (1880–1883) 831. — *Apium Petroselinum* L. Sp. pl. (1753) 264. — *A. Petroselinum* var. *crispum* Willm. Enum. Pl. Hort. Kew. (1798) 16. — *A. Petroselinum* α . *angustifolium* et γ . *crispifolium* Hayne, Getr. Darst. u. Beschr. Arzn. Gebr. Gewachse (1821) 7. — *A. crispum* Mill. Gard. Dict. ed. 8 (1768) No. 2. — *A. latifolium* Mill. l. c. (1768). — *A. vulgare* Lam. Fl. France, III (1778) 444. — *A. laetum* Salisb. Prodr. (1796) 169. — *A. romanum* Zuccagni in Roem. Collect. (1809) 135. — *Carum Petroselinum* Benth. in Benth. et Hook. f. Gen. pl. I (1867) 891. — *C. Petroselinum* var. *crispum* Beck, Fl. Niederösterr. I (1892) 621. — *Selinum Petroselinum* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 41. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 1857.

Biennial; entire plant glabrous; root fusiform, sometimes much thickened; stem 30–100 cm high, branching from middle, branches opposite or whorled, usually exceeding central umbel; leaves dark green, shiny above; radical and lower cauline leaves long-petioled, 2–3-pinnate, with obovate trifid or cuneate deeply dentate lobes, the teeth obtuse, with small whitish mucro; upper leaves ternate, with lanceolate-linear, entire or trifid lobes. Umbels of 10–20 nearly equal glabrous rays; involucre 1–2-leaved, involucrels of 6–8 linear or linear-subulate leaflets subtending the rays for half their length; petals ca. 0.75 mm long; fruit grayish-brown, broadly ovoid, 2.5–3 mm long, 2 mm wide. June–July.

Cultivated in gardens and locally escaped almost throughout the USSR, 375 with the exception of the extreme north. Gen. distr.: Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., Iran., Ind.-Him., Jap.-Ch., N. and S. Am., West Indies, N. and S. Africa, Australia, etc. Described from Sardinia. Type in London.

Economic importance. All parts of the plant have a pungent taste and very pleasant aroma, and it is therefore used in cooking. The herb contains 85% water, 3.66% nitrogeneous substances, 0.72% oil, 0.75% sugar, 6.69% nitrogen-free extractive substances, 1.86% ash, traces of essential oil

(0.06–0.08%), etc. The fruit contains 2–6% essential oil, the main component being apiol, and 22% fatty oil. The cultivated roots reach 15 cm in length and 5 cm in thickness; they are also eaten as a vegetable.

Genus 1000. **SISON** * L.

L. Sp. pl. (1753) 252

Calyx-teeth inconspicuous; petals whitish, rounded, deeply notched, with inward lobe; fruit broadly ovoid, slightly compressed laterally, tapering toward commissure, geminate; stylopodium short-conical; mericarps with 5 filiform ribs; canals single under valliculae, extending over half the length of mericarps nearly claviform; carpophore 2-partite; albumen flat toward commissure. Biennial herbs, with branching stem and 2-pinnate leaves.

Two species, one European, the other known from Asia Minor.

1. *S. amomum* L. Sp. pl. (1753) 252; Boiss. Fl. or. II, 893; Grossg., Fl. Kavk. III, 154. — *S. heterophyllus* Moench, Meth. (1794) 97. — *S. erectum* Salisb. Prodr. (1796) 165. — *Cicuta Amomum* Crantz, Cl. Umbell. Emend. (1767) 96. — *Seseli Amomum* Scop. Fl. Carniol. ed. 2, I (1772) 215. — *Sium Amomum* Roth, Tent. Fl. Germ. II, 1 (1789) 336. — *S. aromaticum* Lam. Fl. France, III (1778) 458. — *Apium Amomum* Car. in Parlat. Fl. ital. VIII (1884) 466. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 1859.

Biennial; entire plant glabrous; root thinly fusiform; stem 30–100 cm high, erect, cylindrical, thinly ribbed, branching, lower leaves long-petioled, simple-pinnate, with 3–4 lobes, these subsessile, ovate-oblong, acute or obtuse, 5 cm long, 1.8 cm wide, unequally incised-dentate; median
376 cauline leaves bipinnate, their primary lobes pinnatisect into elliptic-lanceolate or lanceolate usually dentate lobes; upper leaves small, sessile on scarious-rimmed, triangular sheath, lobes of the last order narrowly linear, entire. Umbels on peduncles, numerous terminal and axillary, of 4–6 glabrous rays; involucre and involucels of 2–5 short linear-subulate leaflets with narrow scarious margins; umbellets 10-flowered; pedicels unequal, some longer than, some several times as long as fruit, the others reduced or nearly obsolete; calyx-teeth inconspicuous; petals whitish, ca. 0.75 mm long, subrounded, broadly and deeply incised with inward lobe, abruptly tapering to short claw; fruit broadly ovoid, 3 mm long, 2.5 mm wide, compressed laterally, blackening when ripe. July–August.

Shrubby formations. — Caucasus: W. Transc. Gen. distr.: Atl. Eur., W. and E. Med., Bal.-As. Min. Described from England. Type in London.

Economic importance. The leaves and fruit are used as a spice by virtue of their unique taste and aroma.

* Greek *sison* or *sinon* — Dioscorides' name for this spice and officinal plant, originally from Syria.

Genus 1001. **CICUTA** * L.

L. Sp. pl. (1753) 255.— *Cicutaria* Lam. Fl. franc. III (1778) 445; Rupr. Fl. ingr., 432.— *Kerascomion* Raf. New Fl. Amer. IV (1836) 21

Calyx with foliate, broadly triangular teeth; petals white, obovate, tapering at base, notched, with narrow inward curved lobe; fruit rounded, compressed laterally, slightly tapering along commissure, appearing nearly geminate; mericarps obtusely pentagonal in cross section, with 5 flat thick obtuse main ribs, the lateral forming the edge of the mericarps; mesocarp spongy; canals single under vallecule, 2 toward commissure. Stylopodium pulvinate; styles long, thin, recurved; stigma capitate; albumen subrounded, subcylindrical, slightly thickened toward commissure; carpophore 2-partite. Perennials, with 2–4-pinnate leaves, flourishing at the edges of swamps and rivers.

Up to 20 species, mainly in N. America, one widespread in Europe and Asia.

1. *C. virosa* L. Sp. pl. (1753) 368; Ldb. Fl. Ross. II, 241; Turcz. Fl. baic.-dah. I, 468; Shmal'g., Fl. I, 386; K.-Pol. in Tr. Az. Ross. XV (1920) 14; Grossg., Fl. Kavk. III, 154; Kryl., Fl. Zap. Sib. VIII, 2023.— *C. cellulosa* Gilib. Fl. lithuan. II (1782) 36.— *C. angustifolia* Kit. in Schult. Oesterr. Fl. ed. 2, I (1814) 515.— *C. tenuifolia* 377 Froel. apud Schrank in Denkschr. Acad. Muench. VII (1818) 56.— *C. aquatica* Dum. Florul. belg. (1827) 77.— *C. pumila* Behm. in Bot. Not. (1887) 180.— *C. orientalis* Deg. et Bald. in Termesz. Közl. Potfüz. XXXVI (1896) 38.— *C. sachalinensis* Koidz. Fl. Symb. Orient. Asiat. (1930) 44.— *Sium Cicut* Web. in Wigg. Prim. Fl. Holsat. (1780) 24.— *Cicutaria aquatica* Lam. Fl. franç. III (1778) 445.— *C. virosa* Delarb. Fl. Auv. ed. 2 (1800) 415.— *Coriandrum Cicut* Roth, Tent. Fl. Germ. I (1788) 130.— *Selinum virosum* E. H. L. Krause in Sturm, Fl. Deutschl. 2 Aufl. XII (1904) 44.— Ic.: Yadovit. rast. lug. i past. (1950) 127, 128; K.-Pol. in Fl. Az. Ross. XV, fig. 1, IV (fruit).— Exs.: G. R. F. No. 668.

Perennial; rhizome in the spring cylindrical, solid, becoming in the fall oblong, hollow and divided by transverse septa into separate chambers; entire plant glabrous; stem hollow, fistular, cylindrical, thinly sulcate, 50–150 cm high, with more or less long roots in lower nodes, branching above; leaves on more or less long petioles, 2-pinnate to the lower leaves nearly 3-pinnate; primary leaflets on petiolules, secondary sessile, the terminal lobes lanceolate or linear-lanceolate, acute, acutely toothed margins, 2–8 cm long, 2–8 mm wide. Umbels of 10–20(25) smooth rays; involucre absent or of 1–2 leaflets; involucels of 8–12 linear-lanceolate or linear glabrous leaflets, slightly shorter than pedicels; petals white, broadly obovate, with inward curved tip; fruit nearly ovoid, 1.5–2 mm long, with thick ribs, cordate at base. June–August.

Hypnum-sedge, peat, shrubby and herbaceous bogs, horsetail thickets, shores of lakes, swampy beds of rivers and streams, alder groves.— Arctic: An.; European part: all regions except for the Crimea; Caucasus:

* From the Greek *kiein* — to be hollow, referring to the hollow, fistular stem.

W. Transc. (Abkhazia); W. Siberia: everywhere; E. Siberia: everywhere; Far East: everywhere; Centr. Asia: Balkh., Syr D., T. Sh. Gen. distr.: Scand., Centr. and Atl. Eur., Bal. (very rarely), Mong., Jap.-Ch. Described from European bogs. Type in London.

Economic importance. *Cicuta virosa* is a poisonous plant. Its roots have a spicy odor and slightly sweet taste. When cut they exude a pale yellow, highly toxic, resinous juice that darkens in contact with air and causes intense poisoning (50% fatal). The poison acts very fast, in 45 minutes to 1 hour, producing epileptic convulsions, dizziness, drowsiness, a sense of intoxication, dilation of pupils, a burning sensation in the abdomen, nausea, thirst, paralysis of the tongue, difficulty in swallowing and breathing, convulsions and death. Post-mortem discloses swelling and gangrenous phenomena in the region of the stomach and intestines, as well as dilated vessels in the region of the brain. To counter the poison
378 weak doses of acetic acid, black coffee, mustard plasters on the back and shoulders and other revulsive agents and stimulants are applied.

The main poisonous agent in the root and, to a lesser degree, in the vegetative parts as well is "cicutoxin" (0.2% in fresh herbs, 3.5% in dried matter), a tarry substance insoluble in petroleum ether, and the alkaloid "cicutine," which has not as yet been sufficiently investigated. The herbage on pastureland and in hay is likewise poisonous to cattle. According to available data 400 g of hay of *Cicuta virosa* L. is enough to kill a horse.

The essential oil obtained from the fruits of *C. virosa* L. contains mainly cumic aldehyde and cymene. The dried fruits yield 0.12–0.36%, containing terpenes ($C_{10}H_{18}$). The green parts also contain essential oil.

Note. The plant shows considerable variation throughout its extensive distribution area. The typical form – var. *classica* K.-Pol. (Fl. Az. Ross. XV (1920) 15) – has lanceolate-linear, terminal lobes 4–5 cm long, 6–10 mm wide; those of var. *latisecta* Celak. (Prodr. Fl. Bohem. (1875) 563) are large, oblong-ovate, 10–12 cm long, ca. 2.5 cm wide; var. *tenuifolia* (Froel.) Koch (Synopsis. Fl. Germ. (1837) 282) is smaller, its narrow leaves (1–3 mm wide) have subentire lobules.

Genus 1002. **TRACHYSPERMUM*** Link

Link, Enum. Horti Berol. I (1821) 267. – *Ammios* Moench, Meth. (1794) 99. – *Phymatis* E. Meyer in Drege, Zwei Pfl. Docum. (1843) 211. – *Tragiopsis* Pomel, Nouv. Mat. Fl. Atl. (1874) 139, non Karst. (1859). – *Ptychotis* sect. *Trachyspermum* DC. Prodr. IV (1830) 108. – *Carum* sect. *Trachyspermum* Benth. in Benth. et Hook. f. Gen. pl. (1867) 891; Baill. Dict. bot. IV (1892) 208.

Calyx-teeth conspicuous, ovate, thickish, obtuse; petals white, deeply obcordate, notched, with inward curved lobe; fruit ovoid, tapering toward apex, obscurely cordate at base, densely covered with whitish vesicular papillae; main ribs obtuse, protruding; valliculae with 1 canal; stylopodium conical; styles barely longer than stylopodium, recurved; stigma capitate. Annuals, with 2–3-pinnate leaves with narrow, sometimes setiform lobes; involucre multifoliate.

379 About 7 species, from Africa to the East Indies.

* From the Greek *trachys* – rough, *sperma* – seed.

1. *T. ammi* (L.) Sprague in Kew Bull. (1929) 228.— *T. copticum* Link, Enum. pl. Horti Berolin. I (1821) 269.— *Sison Ammi* L. Sp. pl. (1753) 252.— *Ammi copticum* L. Mant. (1767) 56.— *Apium Ammi* Crantz, Stirp. Austr. ed. 1, 3 (1767) 109.— *Bunium aromaticum* L. Mant. alt. (1771) 218.— *Daucus copticus* Lam. Encycl. I (1783) 635.— *D. anisodorus* Blanco, Fl. Philipp. ed. 2 (1845) 150.— *Ammios muricata* Moench, Meth. (1794) 99.— *Seseli foenicula-ceum* Poir. Encycl. VII (1806) 137.— *Ligusticum Ajawain* Roxb. ex Fleming in As. Res. XI (1810) 171.— *Ptychotis coptica* DC. in Mem. Soc. phys. Geneve, IV (1828) 496.— *P. Ajowan* DC. l. c. (1828) 497.— *Athamanta Ajowan* Wall. ex DC. l. c. (1828) 497; Wall. Cat. No. 572 (1829).— *Carum copticum* C. B. Clarke in Benth. et Hook. Gen. pl. I (1867) 891.— *C. Ajowan* Benth. et Hook. l. c. 1 (1867) 891.— *C. Korolkowii* Lipsky in Tr. Bot. Sada, XVIII (1900) 66.— *C. Ammi* Sprague in Journ. of Bot. LX (1922) 314, obs.— *Deverra Korolkowii* Rgl. et Schmalh. in Tr. Bot. Sada, V, 2 (1878) 589.— *Pituranthos Korolkowii* Schinz in Bull. Herb. Boiss. II (1894) 209.— *Selinum copticum* E. H. L. Krause in Sturm, Deutschl. Fl. ed. 2, XII (1904) 43.— Ic.: Duthie a. Fuller, Field a. Gard. crops, tab. 73 (1893).

Annual; stem 20–50 cm high, branching at base, like leaves glabrous; leaves 2–3-pinnatisect, lobules of the last order narrowly linear, entire, mucronate, 2–7 mm long, 0.2–0.3 mm wide; upper leaves smaller, not as compound. Umbels on more or less long peduncles, of 6–8 rays; involucre and involucels of 3–5 lanceolate attenuate leaflets with narrow scarious margin; calyx-teeth conspicuous, ovate, thickish, obtuse; petals white, slightly hairy outside along median line, obcordate, deeply notched, with inward curved tip; fruit ca. 2 mm long. July–August.

Cultivated in gardens or escaped, along sides of irrigation ditches. — Centr. Asia: Amu D., Pam.-Al. (Zeravshan River valley, along outskirts of Kyzyl-Kum, Baisun, Farab). **Gen. distr.:** (wild): Ethiopia and Egypt to the East Indies, cultivated for its aromatic fruit in East India, Iran, N. Africa, Asia Minor and in some European countries. Described from Apulia. Type in London.

Economic importance. Cultivated for many years in India and Africa because of its aromatic and spicy fruits. The latter, especially, are used for cooking, especially in India; they contain 25–32% oil, 15–17% protein, 3–6% essential oil. The pale blue or brownish oil also obtained from the 380 vegetative parts, contains thymol, cymene, thymene, and others, and gives off an agreeable odor. It is a source of thymol, a very valuable antiseptic, the residue of which, under the name "thymene," is used to perfume soap. Thymol is widely used in the manufacture of toothpaste and elixirs.

In the USSR *Trachyspermum* is under experimental cultivation in Central Asia and the Crimea (Nikitin garden in Molotov).

Genus 1003. **CRYPTOTAENIA*** DC.

DC. Coll. Mém. V (1829) 42 (nom. conserv.). — *Deringa* Adans. Fam. pl. II (1763) 498. — *Alacospermum* Necker, Elem. I (1791) 161. — *Conopodium* Koch, Pl. Umbell. nov. disp. (1824) 119, ex p. — *Mesodiscus* Raf. New. Fl. Amer. IV (1836) 19. — *Lereschia* Boiss. in Ann. Soc. Nat. 3 sér. Bot. 1 (1844) 127. — *Deeringia* O. Ktze. Rev. pl. I (1891) 266. — *Pimpinella* 19. *Deeringia* O. Ktze. in Post et Ktze. Lexic. phan. (1903) 439.

Calyx-teeth very small, inconspicuous; petals white, ovate-elliptic, with inward curved tip; stylopodium annular; styles with thickened base, recurved; fruit broadly ovoid, laterally compressed, tapering along commissure, geminate in cross section; ribs faintly protruding; canals 2–3 under valliculae, 2 at commissure. Perennial herbs with ternate leaves.

Four species, one in Transcaucasia, one in Africa (Cameroon), one in Italy and 1 in America and E. Asia.

1. *C. flahaultii* (Woron.) K.-pol. in Vestn. Tifl. Bot. Sada, 38–39 (1916) 139. — *Lereschia flahaultii* Woron. in Tr. Yur'evsk. Bot. Sada, IV (1903) 157 et in V (1904) 81. — *Deringa flahaultii* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 136 and in Vestn. Tifl. Bot. Sada, 38–39 (1916) 137; Grossg., Fl. Kavk. III, 155. — Ic.: K.-Pol., ibid., tabl. 5. — Exs.: G. R. F. No. 1364.

381 Perennial; entire plant glabrous; roots short (?), densely covered with thin roots; stem 75–100 cm high, thinly sulcate, erect, leafy for half of its length; radical leaves on long (20–30 cm) thin caniculate petioles, inflated beneath, with membranous margin expanding to short sheath, blade ternate, subrounded, 10–15 cm across; leaflets broadly obovate, cuneately tapering at base, the upper obscurely 3-lobed, the lateral more deeply 2-lobed (with smaller lateral lobe), all leaves large-toothed, in addition to small teeth with prickly tip, paler beneath; cauline leaves smaller, on shorter petioles. Inflorescence large, paniculate, the branches alternate below, nearly whorled above; branches of the last order thin, capilliform, terminating in reduced umbels; umbels of 4–6 smooth rays; involucre of 1–3 linear leaflets with narrow scarious margin; umbellets of 3–5 very unequal rays; involucels of 2–4 linear leaflets; flowers small, polygamous; fruit broadly ovoid, 2 mm long, 1.75 mm wide. June.

Shady, wooded ravines. — Caucasus: W. Transc. (Abkhazia). Endemic. Described from Abkhazia. Cotype in Leningrad.

Genus 1004. **AMMI**** L.

L. Sp. pl. (1753) 243. — *Visnaga* Gaertn. Fruct. I (1788) 92. — *Apium* Sect. III *Ammi* Calest. in *Webbia* I (1905) 175

Flowers bisexual; calyx-teeth very small, not inconspicuous; petals white, the peripheral enlarged, abruptly tapering to short claw, obcordate or deeply 2-lobed, the lobules unequal; stylopodium short-conical, slightly undulant; styles becoming recurved; stigma capitate; fruit broadly ovoid,

* From the Greek *cryptos* — hidden; *taenia* — band, stripe, referring to the canals hidden in the depths of the fruit.

** Greek *ami* — Dioscorides' name for the plant, apparently from the Greek *ammos* — sand, referring to its habitat.

slightly compressed laterally, tapering along commissure, glabrous, smooth; mericarps with filiform ribs, much narrower than valleculeae, circular-pentagonal in cross section; canals single under valleculeae, 2 toward commissure; albumen semiround in cross section, nearly flat toward commissure; carpophore entire. Biennial glabrous plants, with 2-3 pinnate leaves, lobules of the last order linear or linear-filiform, involucre leaflets pinnatisect.

Six species in the Mediterranean area.

Section 1. *VISNAGA* Pers. Syn. pl. I (1805) 307. — All leaves uniformly tripinnatisect, lobules of the last order spreading, acuminate; peduncles and umbel rays expanded-thickened at apex in fruit, rays compressed; leaflets of involucre setiform.

1. *A. visnaga* (L.) Lam. Fl. Franç. III (1778) 462; Ldb. Fl. Ross. II, 246; Grossg., Fl. Kavk. III, 155. — *A. dilatatum* St.-Lag. in Ann. soc. bot. Lyon, VII (1880) 119. — *Daucus visnaga* L. Sp. pl. (1753) 242. — *Apium visnaga* Crantz, Cl. Umbell. emend. (1767) 104. — *Sium visnaga* Stokes, Bot. Mat. med. II (1812) 106. — *Visnaga daucoides* Gaertn. De fruct. I (1788) 192. — *V. vera* Raf. New. Fl. Amer. IV (1836) 28. — *Selinum visnaga* E. H. L. Krause in Sturm. Fl. Deutschl. 2 Aufl. XII (1904) 44. — Ic.: Gaertn. l. c. tab. 21. — Exs.: Herb. Fl. Cauc. No. 92.

Biennial; stem to 1 m high, erect, cylindrical, subulate, branching; leaves 2-3-pinnatisect into thin, linear or linear-filiform, entire, spreading thinly acuminate lobules, 2-3 cm long, 0.5-1 mm wide. Umbels 6-10 cm across on long peduncles; of numerous (to 100) glabrous, unequal rays, spreading at flowering, compressed and stiffening in fruit; leaflets of involucre numerous, slightly thickening; leaflets of involucre numerous, setiform, acute, entire; petals white, 1-1 $\frac{1}{3}$ mm long; fruit ovoid or ovoid-oblong, 2-2.5 mm long, ca. 1.5 mm thick; carpophore not parted. June-July.

Solonchik steppes, dry slopes. — Caucasus: Cisc., E., W. and S. Transc., Tal. Gen. distr.: W. and E. Med., N. Afr., Bal.-As. Min., Iran. Described from S. Europe. Type in London.

Note. Lespinasse reported *A. majus* L. from the Crimea (Sevastopol'); later investigators failed to corroborate this record.

Genus 1005. **FALCARIA** * Bernh.

Bernh. Syst. Erf. Pfl. (1800) 176. — *Prionitis* ** Adans. Fam. II (1763) 499; Kozo-Pol. in Tr. Bot. Sada, XXXVI, 1 (1929) 35. — *Drepanophyllum* Wibel, Prim. Fl. Werth. (1799) 196. — *Critamus* Bess. Enum. Volh. (1821) 98, non Hoffm. (1814). — *Sium* sect. *Falcaria* Ficin et Heynh. Flora der Geg. um Dresden 3 Aufl. (1838). — *Carum* sect. *Falcaria* Baill. Hist. de plantes, VI (1880) 118-119.

Flower bisexual, often staminate; calyx-teeth, at least in bisexual flowers, short-triangular; petals white, obcordate, notched to 2-lobed, with inward curved lobe; fruit compressed laterally, narrowly oblong or

* From the Latin *falx* — sickle, referring to the shape of the leaf lobes.

** Although *Prionitis* (like *Drepanophyllum*) has priority, *Falcaria* has been adopted in accordance with the decisions of the International Botanical Congress in Vienna, in 1905.

narrowly ovoid; mericarps with 5 thickish obtuse ribs, each bearing a
 383 bundle of sclerenchymatous fibers; filiform canals single under valle-
 culae, 2 toward commissure; albumen flat toward commissure. Biennials,
 with entire, simple or biternate leaves; acutely serrate leaflets.

Four species in the Mediterranean area, C. Europe, Asia Minor,
 Central Asia and W. Siberia.

1. Involucre and involucels present. 1. *F. sioides* (Wib.) Aschers.
 + Involucre and involucels absent
 2. *F. falcarioides* (Bornm. et Wolff) Wolff.

1. *F. sioides* (Wib.) Aschers. Fl. Prov. Brandenb. (1864) 241;
 Kryl., Fl. Zap. Sib. VIII, 2026.— *F. vulgaris* Bernh. Syst. Erf. Pfl.
 (1800) 176; Grossg., Fl. Kavk. III, 156.— *F. rivini* Host, Fl. Austr.
 I (1827) 381; Ldb. Fl. Ross. II, 245; Boiss. Fl. or. II, 892; Shmal'g.,
 Fl. I, 387.— *F. glauca* Dulac, Fl. Haut. Pyren. (1867) 351.— *F. per-*
sica Stapf et Wettst. in Denkschr. Acad. Wien, L. (1886) 48.—
Falcaria Karsten, Deutschl. Fl. (1880–1883) 835.— *F. serrata* St.
 Lag. in Carriot, Etud. fl. ed. 8, II (1889) 360.— *Sium falcaria* L.
 Sp. pl. (1753) 252.— *S. falcatum* Dubois, Meth. Ed. I (1803) 422.—
Seseli falcaria Crantz, Stirp. Austr. ed. 2 (1769) 208.— *Drepano-*
phyllum sioides Wib. Prim. Fl. Werth. (1799) 196.— *D. agreste*
 Hoffm. Gen. Umbell. ed. 2 (1816) 109.— *D. falcaria* Desv. Fl. Anjou
 (1827) 248.— *Prionitis falcata* Delabre, Fl. Auv. ed. 2 (1800) 421.—
P. falcaria Dum. Fl. belg. (1827) 77; K.-Pol. in Fl. Az. Ross. XV
 (1920) 37.— *Bunium falcaria* M. B. Fl. taur.-cauc. I (1808) 211.—
Critamus agrestis Bess. Enum. Volh. (1821) 98.— *C. falcaria*
 Rchb. in Mossl. Handb. ed. 2 (1827–1829) 478.— *Helosciadium*
falcaria Hegetschw. Fl. Schw. (1839) 262.— *Carum falcaria*
 Lange in Willk. et Lange, Prodr. Fl. Hisp. III, 1 (1874) 92.— *Selinum*
falcaria E. H. L. Krause in Sturm, Fl. Deutschl. 2 Aufl. XII (1904)
 45.— Ic.: Syreishch., Fl. Mosk. Gub. IV (1914) 136.— Exs.: G. R. F.
 No. 516.

Biennial; plant more or less glaucous; root fusiform, straight; stem
 30–60 cm high, branching, like radical leaves glabrous or with very short
 velutinous hairs beneath, glabrous above; leaves subcoriaceous, the radical
 long-petioled, entire or ternate; lower cauline leaves simple or biternate,
 15–25 cm long; primary lobes long-petioled, the secondary sessile, the
 terminal secondary lobes usually 3-partite, with linear-lanceolate, 5–10 cm
 long, 3–8 mm wide lobules, often with cartilaginous, acuminate denticles
 and subulate-acuminate tip; upper cauline leaves less compound, with
 384 sheathed petioles. Umbels numerous, of 5–10 smooth, nearly equal rays
 arranged in nearly corymbiform panicle; involucre and involucels of
 4–8 unequal, linear-subulate leaflets; fruit oblong-linear, 3–4 mm long,
 1 mm wide. July–August.

Steppes, shrubs, forest edges, roadsides, meadows, weed among crops. —
 European part: Lad.-Ilm., Balt., U. Dnp., M. Dnp., U. V., V.-Kama, V. Don,
 Transv., U. Dns., Bes. (?), Bl., L. Don, L. V., Crim.; Caucasus; every-
 where; W. Siberia: U. Tob., Irt., Alt. (SW); Centr. Asia: Ar.-Casp., Balkh.,

Dzu-Tarb. (Kopal), T. Sh. (W.), Pam.-Al., Syr D., Mtn. Turkm. Gen. distr.: Scand., Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., introduced into N. Afr., N. and S. Am. Described from Wertheim. Type in Berlin.

Economic importance. Sometimes a weed of crops, mostly of spring crops.

2. *F. falcarioides* (Bornm. et Wolff) Wolff in Engl. Pflanzenr. IV, 228 (1927) 132. — *Pimpinella falcarioides* Bornm. et Wolff in Verhandl. zool-bot. Gesellsch. in Wien, LX (1910) 117. — *Scaligeria falcarioides* Hausskn. in Herb. ex Bornm. et Wolff, l. c.

Biennial; entire plant glabrous; root thick, turnip-shaped; stems 30–45 cm high; single, slightly branching; radical leaves with thickish flattened, 2–3 cm long petioles, expanding to short narrow sheath, blade stiff, entire, very rarely with 2 short leaflets or 1 ovate-cordate leaflet at base, ovate-oblong or linear-oblong, obscurely cordate or cordate at base, short-acuminate, 2–5 cm long, 0.6–2.5 cm wide, with cartilaginous serriform-dentate margin, with small teeth, appearing scabrous with very short antrorse mucro under magnification; cauline leaves reduced to sheath or with very small 3-partite or pinnatisect blade and linear lobes. Umbels 2–4 cm across, of 5–8 rounded smooth unequal rays; involucre and involucels absent; umbellets 12-flowered, ca. 1 cm across, with thickish pedicels; petals white, rounded, ca. 1.5 mm long, notched to 2-lobed; fruit glabrous, ovoid, distinctly compressed laterally, ca. 3 mm long; stylopodium short-conical, styles recurved, nearly twice as long as stylopodium. July. (Plate XXVII, Figure 3.)

Solonetzc meadows. — Caucasus. S. Transc. (near Gilli Lake). Gen. distr.: As. Min., Arm.-Kurd., Iran. Described from near Lake Urmia and Akhmedabad. Type in Vienna.

385 Genus 1006. **CARUM*** L.

L. Sp. pl. (1753) 263. — *Carvi* Mill. Gard. Dict. ed. 4 (1754). — *Careum* Adans. Fam. II (1763) 95. — *Lomatocaryum* Fisch. et Mey. Ind. sem. Hort. Petrop. VI (1840) 17, 59. — *Selinopsis* Coss. et Dur. ex Munby, Cat. pl. Alger. ed. 1 (1859) 13. — *Anisactis* Dulac, Fl. Hautes-Pyrén. (1867) 347. — *Bunium* Sect. I *Carum* Godr. in Gren. et Godr. Fl. Fr. I (1848) 729. — *Carum* Sect. I *Eucarum* Boiss. Fl. or. II (1872) 878. — *Apium* Caruel in Parl. Fl. ital. VIII (1889) 424, ex p. — *Apium* Sect. IV *Carum* Calest. in Webbia, I (1905) 175. — *Pimpinella* § 1. *Carum* O. Ktze. in Post et Ktze. Lex. gen. pl. (1904) 439

Flowers bisexual or partly staminate; calyx-teeth inconspicuous; petals white, pink or red, rounded-obovate, deeply notched, with inward curved lobe; stylopodium pulvinate, with flattened undulant margin; styles thin, elongate; recurved stigma capitate; fruit oblong, slightly compressed laterally; ribs obtuse; valliculae broad, with 1 canal, 2 canals toward commissure; carpophore parted in upper part. Perennials or biennials, with bi- or tri-pinnate leaves; umbels with or without involucre and involucels.

Up to 30 species in Europe and Asia.

* Greek *karos* or *karon* — Dioscorides' name for an umbelliferous plant, whose fruits, like those of coriander, were used in medicine. According to Pliny, the name is derived from *Caria* in Asia Minor, supposed to produce the best cumin. An alternative derivation refers to *kara* or *kar* — head.

- 386
1. Involucre of 3–9 leaflets 2.
 - + Involucre absent or 1 of 1–2 caducous leaflets 4.
 2. Leaflets of involucre erect, often pinnately or ternately incised; stems leafless or with 1–2 leaves; umbel of 4–7 rays 6. *C. caucasicum* (M. B.) Boiss.
 - + Leaflets of involucre reflexed, narrowly linear or filiform, always entire; stems with 2–5 leaves; umbel usually of 7–14, rarely fewer rays 3.
 3. Leaves 2- or 3-pinnatisect, with thin linear lobes 7. *C. meifolium* (M. B.) Boiss.
 - + Leaves simple-pinnate, leaflets obtusely-dentate above 8. *C. grossheimii* Schischk.
 4. Leaves on stem absent or 1–2; high-mountain plant of the Caucasus 6. *C. caucasicum* (M. B.) Boiss.
 - + Leaves on stem 2 or several 5.
 5. Involucels absent 6.
 - + Involucels of 2 to many leaflets 7.
 6. Umbel rays unequal, especially in fruit; fruit aromatic; sheath of upper leaves not colored 1. *C. carvi* L.
 - + Umbel rays nearly equal; fruit not aromatic; sheath of upper leaves usually with purple margins 2. *C. porphyrocoleon* (Frey et Sint.) Woron.
 7. Umbel rays scabrous 8.
 - + Umbel rays glabrous 9.
 8. Leaflets of involucels setiform; leaves geniculately curved beneath 3. *C. alpinum* (M. B.) Benth. et Hook.
 - + Leaflets of involucels lanceolate-linear; leaves erect 4. *C. saxicolum* Alb.
 9. Umbel rays 10–15 (E. Siberia) 10. *C. buriaticum* Turcz.
 - + Umbel rays 5–10 10.
 10. Leaves thinly dissected, terminal lobules linear or lanceolate-linear, ca. 1 mm wide (Centr. Asia) 9. *C. atosanguineum* Kar. et Kir.
 - + Terminal leaf lobes ovate, 3–4 mm wide (Caucasus); styles 2–3 times as long as stylopodium 5. *C. komarovii* Karjag.

Section 1. *CARVI* DC. Prodr. IV (1830) 115. — *Carum* Sect. *Eucarum* Boiss. Fl. or. II (1872) 879, exp. — *Carum* sect. *Fusiformia* Drude in E. — P. Natürl. Pflanzenfam. III, 7–8 (1898) 192. — Biennial or perennial herbs, with vertical fusiform root or creeping rhizome; leaves usually pinnatisect into linear-lanceolate lobules; canals single under valleculae; petals white or pink.

Series 1. *Carea* Schischk. — Involucre and involucels absent.

1. *C. carvi* L. Sp. pl. (1753) 263; Ldb. Fl. Ross. II, 248; Turcz. Fl. baic.-dahur. I, 471; Shmal'g., Fl. I, 394; Kryl., Fl. Zap. Sib. VIII, 2079. — *C. decussatum* Gilib. Fl. lithuan. II (1782) 37. — *C. aromaticum* Salisb. Prodr. (1796) 169. — *C. officinale* S. F. Gray, Nat.

Arr. Brit. Pl. II (1821) 515. — *C. rosellum* Woron. in Tr. Bot. Inst. ser. 1, I (1933) 218. — *Apium carvi* Crantz, Cl. Umbellif. (1767) 103. — *Seseli carum* Scop. Fl. Carniol. ed. 2, I (1772) 215. — *S. carvi* Lam. Fl. Fr. III (1778) 431; Encycl. VII (1806) 136; Spreng. in Schult. Syst. VI (1820) 414. — *Sium carum* Weber in Wigg. Prim. Fl. Holsat. (1780) 24. — *S. carvi* Bernh. Syst. Verzeichn. Erf. (1800) 173. — *Ligusticum carvi* Roth, Tent. Fl. Germ. I (1788) 124. — *Aegopodium carum* Wibel, Prim. Fl. Werth. (1799) 199. — *Bunium carvi* M. B. Fl. taur.-cauc. I (1808) 211. — *Foeniculum carvi* Link, Enum. Hort. Berol. I (1821) 284. — *Falcaria carvifolia* C. A. M. Beitr. Pflanzk. Russ. Reich. I (1844) 14. — *Pimpinella carvi* Jessen, Deutsche Excursionsfl. (1879) 191. — *Carvi careum* Bubani, Fl. Pyren. II (1900) 352. — *Selinum carvi* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 407. — Ic.: Syreishch., Ill. Fl. Mosk. gub. (1907) 401.

Perennial or biennial; entire plant glabrous; root fusiform or cylindrical, fleshy; stem erect, 30–80 cm high; branching in upper part; leaves oblong, the lower long-petioled, the upper on short petioles expanding to sheath, with white or pink-membranous margin; leaf blade 2 or nearly 3-pinnate, 6–15 cm long, 2–8 cm wide; primary lobes sessile, ovate-lanceolate, acuminate, cut into lanceolate-linear or sublinear acute, 3–7 mm long, 1–1.5 mm wide lobules. Umbels 4–8 cm across, of 8–16 unequal glabrous rays; involucre absent or of 1–2 leaflets; umbellets ca. 1 cm across; involucels absent; calyx-teeth inconspicuous; petals white or pink, broadly obovate, ca. 1.5 mm long; styles recurved; fruit ca. 4 mm long, 2.5 mm wide. June–July.

Meadows, sometimes solonchak, thinned coniferous or mixed forests or along forest edges, near roads, dwellings and weeds in fields, to 4,000 m. — European part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., Balt., V.-Kama, U.Dnp., M. Dnp., U. V., V.-Don, U. Dns., Bes., Bl., L. Don, Transv.; Caucasus: everywhere; W. Siberia: everywhere; E. Siberia: everywhere; Far East: Kamch.; Centr. Asia: Dzu-Tarb., T. Sh., Pam.-Al., Mtn. Turkm. Gen. distr.: Centr. and Atl. Eur., Med., N. Afr., Bal.-As. Min., Arm.-Kurd., Iran., Sinkien, Mong., Him. Introduced in N. America, New Zealand. Described from N. Europe. Type in London.

Economic importance. Caraway has been cultivated in Europe since the time of the pile-dwellings. It is currently grown in the USSR, Finland, Germany, Norway and Holland. The fruit has a unique aroma and is used in cooking; the crushed or mashed fruit yields 3.1–7% essential oil by distillation with steam. This is colorless at first; in the course of preservation it turns yellowish, and develops the typical odor and spicy taste of caraway. Fifty–sixty percent of the oil is a ketone — "carvone." In addition there is also 35 to 55% of a terpene — "limonene" ($C_{10}H_{16}$). Caraway oil is used in the manufacture of soap and in liquor and vodka. The cake obtained after the extraction of oil contains 14–16% fat and 20–25% protein, and is a possible source of technical fatty oil; the waste products are a good feed for cattle.

Michurin's agrobiological led to the introduction of caraway into the USSR, as an annual crop with a harvest of 710 kg per ha, not inferior to that of the biennial. This is a fine achievement, as an annual harvest replaces a biennial one (Sots. zemled. No. 122 24 V 1950).

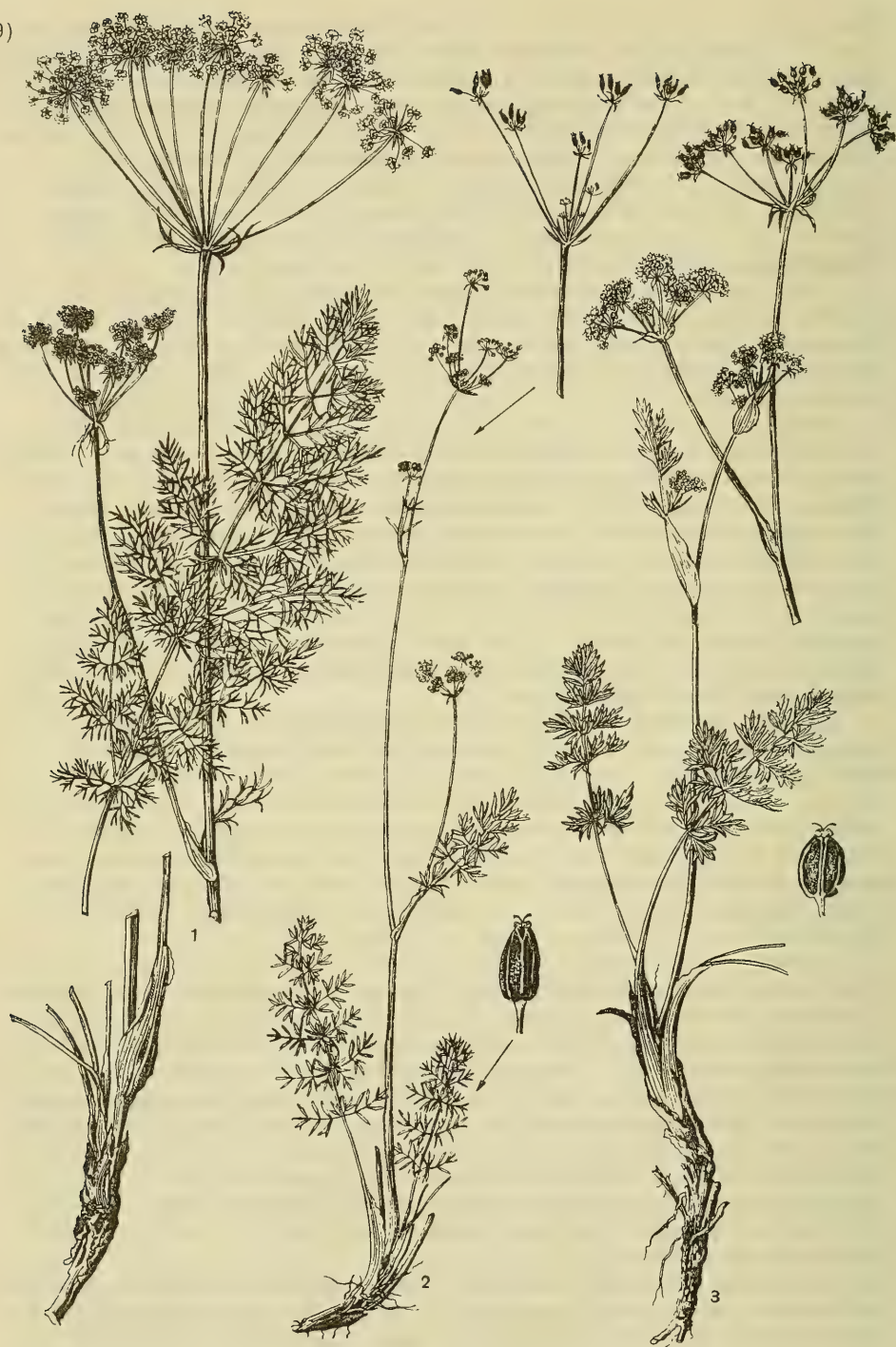


PLATE XXVI. 1—*Carum buriaticum* Turcz.; 2—*C. atrosanguineum* Kar. et Kir.; 3—*C. caucasicum* (M. B.) Boiss.

2. *C. porphyrocoleon* (Freyn et Sint.) Woron. in Sched. ad Herb. Fl. Cauc. fasc. 21, No. 523 (1931) nomen. — *Carum leucocoleon* β . *porphyrocoleon* Freyn et Sint. in Sint. It. orient. (1894) No. 7274. — Exs.: Herb. Fl. Cauc. No. 523; Sint. It. orient. No. 7274.

Biennial or perennial; root ascending, fusiformly thickened, straight; stem single, 15–45 cm high, erect, branching from middle or only above the branches, obliquely ascending, stem and leaves glabrous; radical leaves 1–2, ovate-oblong, usually early withering, the petioles nearly as long as blade, gradually passing to oblong sheath, total length 6–10 cm long, 2–4 cm wide, their blade tripinnatisect into linear, sometimes subfiliform lobules, 3–5 mm long, 0.3–0.5 mm wide; cauline leaves few, similar to the radical, upper leaves smaller, sessile on amplexicaul sheath, with membranous, usually violet-colored margins. Umbels of 5–11 glabrous slightly unequal or nearly equal rays; involucre and involucre absent; petals white, ca. 1 mm long, deeply notched, with short inward curved tip; fruit ovoid, 4–5 mm long, 2–2.5 mm wide, without the aroma of caraway; stylopodium conical; styles recurved, slightly longer than stylopodium. July.

Mountain meadows, sometimes dampish meadows. — Caucasus: W. and E. Transc. (W.). Gen. distr.: Arm.-Kurd. Described from vicinity of Bakuriani. Type in Leningrad.

Series 2. *Alpina* Schischk. — Involucels present, involucre absent. Umbel rays scabrous.

3. *C. alpinum* (M. B.) Benth. et Hook. Gen. Pl. I (1867) 891. — *C. lomatarum* Boiss. Fl. or. II (1872) 879; Grossg., Fl. Kavk. III, 157. — *C. lomatarum* var. *filifolium* Somm. et Lev. in Tr. Bot. Sada, XVI (1900) 179. — *Seseli alpinum* M. B. Fl. taur.-cauc. I (1808) 236. — *Lomatocarpum alpinum* Fisch. et Mey. Ind. VI sem. Horti Petropol. (1840) 17; Ldb. Fl. Ross. II, 252. — Exs.: Herb. Fl. Cauc. No. 165.

Perennial; entire plant glabrous; root ascending, 0.5 cm thick; stems 10–45 cm high, single, thin, cylindrical, simple or branching; leaves with geniculately curved blade, radical leaves ovate, 8–18 cm long, 5–10 cm wide, 2–3-pinnatisect, their petioles long, thin, abruptly passing to sheath with broad white-scarious margin, primary lobes ovate, thin-petioluled, often recurved, secondary lobes broadly ovate, sessile, pinnatifid into lanceolate or linear, 5–8 mm long, 0.5–3 mm wide lobules; terminal lobules longer, upper leaves 1–3 cm long. Umbels 3–8 cm across, of 8–14 unequal rays acutely scabrous inside; involucre absent or of 1–2 narrowly linear leaflets; umbellets ca. 1 cm across, with scabrous pedicels; involucels of 4–5 unequal setiform leaflets, the longest nearly as long as umbellet or longer; calyx-teeth inconspicuous; petals white, ca. 1 mm long, ovate, notched, with inward curved tip; fruit ovoid, 4 mm long, 2 mm wide, with narrowly winged ribs; stylopodium conical; styles much longer than stylopodium, reflexed. July–August.

Mountain fir, spruce and mixed pine-birch forests, alpine meadows and rocks. — Caucasus: Cisc., Dag., W. and E. Transc. (Greater Caucasus). Endemic. Described from Kaishaur Mountain. Type in Leningrad.

Note. Plants growing in shady fir and spruce forests have lanceolate or narrowly ovate terminal lobes, those growing in open habitats have linear lobes.

4. *C. saxicolum* Alb. in Tr. Tifl. Bot. sada, I (1895) 103; Grossg., Fl. Kavk. III, 157.

Perennial; root vertical, branching above; stem and leaves glabrous, slightly branching, curved, 12–20 cm high; radical leaves long-petioled, lanceolate-oblong, 4–6 cm long, 1.2–1.5 cm wide, bipinnatisect with lanceolate-linear, acute, protruding nerves, lobules 1–5 mm long, 0.5–1 mm wide, with inward rolled margins; lower cauline leaves simple or bipinnate, much shorter than the radical, petioles much shorter, with inflated sheath; upper cauline leaves with few lobes sessile on sheath or reduced to sheath.

392 Umbels of 8–10 unequal scabrous rays; involucre absent or of 1–2 linear or lanceolate leaflets; involucels of 5–7 lanceolate-linear or linear-subulate acute leaflets as long as umbellet or shorter, with scarious margin; fruit (immature) with narrowly winged ribs; stylopodium short-conical; styles longer than stylopodium, reflexed. August.

Limestone rocks in alpine belt, ca. 2,000 m. — Caucasus: W. Transc. (Migariya Mountain). Endemic. Described from Migariya Mountain. Type in Geneva, cotype in Leningrad.

Series 3. *Komaroviana* Schischk. — Involucels present. Lobes of the last order ovate or cuneate-rhombic.

5. *C. komarovii* Karjag. in Izv. Azerb. Fil. AN SSSR, 10 (1944) 48.

Perennial; entire plant glabrous; root ascending, 4–5 mm thick in upper part; stem single or few, 15–45 cm high, its base with cinnamon-brown leaf remnants, branching nearly from base, with few obliquely ascending branches; radical leaves on long petioles expanding to sheath with scarious margin, leaves oblong-ovate, nearly bipinnatisect, with petiole 4–18 cm long, 2–5 cm wide; lobes of the first order 3(4) pairs, petioluled, tapering above; upper pair of lobes sessile or subsessile, the lower divided into 5, the upper into 3 lobes of the second order (the lower pair is petioluled); secondary lobes ovate or cuneate-rhombic, unevenly incised-dentate, usually with 2 deeper incisions, the ovate obtuse lobules or teeth terminated by a cartilaginous mucro, green above, paler beneath, with distinctly protruding network of nerves; terminal segments deeply tripartite; cauline leaves 1–3, much smaller than the radical, the petiole expanding to sheath with scarious margin, often tightly pressed to stem; lower leaves (1–2) similar to the radical, smaller, but with fewer usually also narrower secondary lobes or simple-pinnatisect; the upper leaves reduced, ternate, with nearly entire narrow lobes, the terminal elongate, linear or narrowly lanceolate; involucre absent or of 1 linear leaflet; involucels of 2–4 narrowly linear or subulate-leaflets. Umbel of 5–10 unequal, sharply faceted, nearly winged rays slightly cartilaginous-dentate above, like rays of umbellets compressed in fruit; umbellets of (5)7–11(14) rays, the central nearly half the length of the marginal or all rays of some umbellets short; marginal flowers in umbellets bisexual, the central staminate; calyx-teeth absent; petals ca. 1 mm long,

93 white, obovate, cordately notched, with inward curved lobe; fruit oblong-elliptic, 4–5 mm long, strongly compressed laterally, glabrous, brown, slightly shiny; mericarps often (when one abortive) falcate, with 5 thin acute, prominent nearly winged whitish ribs and broad valliculae; oil tubes in valliculae and commissure, filiform, slightly flexuous, interrupted, irregular in number (2–6 in valliculae); styles reflexed in fruit, nearly twice as long as obtusely conical stylopodium. July.

Taluses and stony slopes, alpine belt at 2,000–3,000 m. — Caucasus: E. and S. Transc. Endemic. Described from Koshkar-Dag Mountain. Type in Baku.

Series 4. *Caucasica* Schischk. — Involucre and involucels present. High-mountain plants of the Caucasus.

6. *C. caucasicum* (M. B.) Boiss. Fl. or. II (1872) 880; Grossg., Fl. Kavk., III, 156. — *C. humile* Boiss. et Bal. in Boiss. Fl. or. II, 881, nom. in synonym. — *Laserpitium caucasicum* M. B. Fl. taur.-cauc. I (1808) 222. — *Cnidium carvifolium* M. B. Fl. taur.-cauc. III (1819) 212; DC. Prodr. IV, 153; Ldb. Fl. Ross. II, 284. — *C. venosum* DC. l. c. 152, non Koch, quo ad plant. cauc.

Perennial; root long, vertical, narrowly fusiform, 0.3–0.7 cm thick; stems 4–35 cm high, single or few, ascending or erect, simple, rarely branching, leafless or with 1–3 leaves; petioles of radical leaves as long as or slightly shorter than blades, expanding to sheath, their blades oblong, 2.5–9 cm long, 1–3 cm wide, nearly bipinnatisect; primary lobes 4–7 pairs, sessile, broadly ovate, pinnatifid into obtuse lanceolate or linear, entire or deeply dentate lobules; cauline leaves, if present, sessile on dilated, slightly inflated amplexicaul sheath with scarious margins. Umbels 1.5–3 cm across, of 4–7 unequal glabrous rays; involucre of 1–3 entire or pinnate, sometimes ternately incised, usually straight leaflets, rarely involucre absent; umbellets 4–8 mm across, with glabrous pedicels; involucels of 5–6 lanceolate-linear, broadly scarious usually antrorse leaflets, shorter than or nearly as long as rays; petals white, ca. 1 mm long, notched, with inward curved tip; fruit ovoid, 3 mm long, 1.5 mm wide; stylopodium short-conical; styles reflexed, longer than stylopodium. July. (Plate XXVI, Figure 3.)

94 Alpine meadows, old moraines, 2,500–3,300 m. — Caucasus: Cisc., Dag., E., W. and S. Transc. Gen. distr.: Pontus Range. Described from Kaishaur Mountain in the Main Range. Type in Leningrad.

7. *C. meifolium* (M. B.) Boiss. Fl. or. II (1872) 880; Grossg., Fl. Kavk., III, 156. — *Cnidium meifolium* M. B. Fl. taur.-cauc. III (1819) 213; DC. Prodr. IV, 153; Ldb. Fl. Ross. II, 284. — *Carum armenum* Boiss. in Ann. Sc. Nat. 3 sér. Bot. II (1844) 137.

Biennial or perennial; entire plant glabrous; root fusiform, 0.6–1 cm thick above, gradually tapering below; stem single, 10–40 cm high, straight, branching in upper half or nearly from base; radical leaves early withering, their petioles gradually tapering to long sheath with scarious margin, their blades ovate, 2.5–4 cm long, 1.5–2.5 cm wide, bipinnatisect into linear

acute, 3–10 mm long, ca. 0.5–1 mm wide lobules; upper leaves similar, smaller, sessile on oblong sheath.

Umbels 2.5–3.5 cm across, of 6–14 glabrous slightly unequal ribbed rays; involucre of 7–11 lanceolate-subulate or linear leaflets, usually reflexed; umbellets ca. 1 cm across; pedicels glabrous; involucels of 5–7 unequal narrowly linear or filiform reflexed leaflets; petals white or pink, ca. 1.5 mm long, rounded, cuneately tapering at base, notched, with inward curved tip; fruit ovoid, 4 mm long, 2 mm wide; ribs thickish, protruding; stylopodium short-conical, styles divergent, longer than stylopodium. June–July.

Subalpine and alpine meadows, 2,200–3,000 m. — Caucasus: Greater Caucasus, Dag., E., W. and S. Transc. Endemic. Described from the Caucasus. Type in Leningrad.

8. *C. grossheimii* Schischk. in Bot. zhurn. XXXIII, 3 (1948) 315. — Ic.: Ibid., fig. 1.

Biennial or perennial; root vertical, fusiformly thickened; stem straight, 35–50 cm high, branching from middle or nearly simple, like leaves glabrous; radical leaves oblong, early withering, simple or nearly bipinnate, rather long-petioled, with obtusely, distally dentate, sessile or short-petioluled terminal lobes 1–2 cm long, 0.5–1 cm wide in upper part; cauline leaves similar, much smaller, usually simple-pinnate. Umbels terminate stem and branches, 2.5–3.5 cm across, of 9–13 unequal glabrous rays; involucre of 3–9 linear reflexed, glabrous leaflets, half the length of the
395 rays, sometimes cut into 2–3 lobes; umbellets many-flowered, ca. 1 cm across; involucel of 5–7 narrowly linear unequal reflexed leaflets; calyx-teeth inconspicuous; petals pink-purple or white, obcordate, 1.5 mm long and as wide, notched, with short inward curved tip; fruit (not quite ripe) ovoid, 2.5 mm long, 1.5 mm wide; stylopodium short-conical; styles reflexed, longer than stylopodium. July–August.

Alpine meadows 1,800–2,700 m. — Caucasus: Main Range (W.). Endemic. Described from Svanetia. Type in Leningrad.

Series 5. *Atrosanguinea* Schischk. — Involucre absent, involucels present. Low plants with few-rayed (5–10) umbellet. Mountains of Central Asia and Siberia.

9. *C. atrosanguineum* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 359; Ldb. Fl. Ross. II, 249; Kryl., Fl. Zap. Sib. VIII, 2080. — ? *C. carvi* γ. *nanum* DC. Prodr. IV (1830) 115. — *C. indicum* var. *alpestris* Herd. in Bull. Soc. Nat. Mosc. XXXIX, 3 (1866) 72.

Perennial; entire plant glabrous; root oblong; stems 15–40 cm high, few or single, slightly branching in upper part; radical and lower cauline leaves tripinnate, oblong, their blades 4–12 cm long, 1.5–5 cm wide; petioles 4–10 cm long, the upper leaves smaller, less dissected, on dilated sheath with scarious margins; primary lobes ovate, obtuse, 1–2.5 cm long, 0.5–2 cm wide; petiolules 1–6 mm long; lobes of the last order lanceolate, acute, 3–10 mm long, 1–1.5 mm wide. Umbels of 5–10 unequal rays;

involucre absent or of 1–2 linear or lanceolate-linear leaflets; umbellets few-flowered; involucels of 2–5 lanceolate-linear or linear leaflets nearly as long as pedicels; calyx-teeth inconspicuous; petals pink or nearly white, rarely dark red; fruit oblong-ovoid, 4 mm long, 2 mm wide. June–July. (Plate XXVI, Figure 2.)

Pebbly slopes and banks of streams in mountain regions, subalpine belt and upper reaches of forests. — W. Siberia: Alt. (SW), Ang.-Say. (W. Sayans); Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. Gen. distr.: Mountains of Sinkiang. Described from Dzungarian Ala-Tau, upper reaches of the Lepsa and Sarkand rivers. Type in Leningrad.

Series 6. **Buriatica** Schischk. — Involucre present, umbels glabrous, of 10–15 rays.

10. *C. buriaticum* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 92, nom. nud.; XVII (1844) 713; Ldb. Fl. Ross. II, 244; Kryl., Fl. Zap. 96 Sib. VIII, 2080. — *C. inodorum* Stev. in Pall. Neue Nord. Beitr. III (1796) 229, nom. nud.; Wolff in Pflanzenr. IV, 228 (1927) 159. — *Bunium buriaticum* Drude in E.-P. Natürl. Pflanzenfam. III (1898) 194. — Exs.: G. R. F. No. 2610.

Biennial; entire plant glabrous; root cylindrical or fusiform, 6–12 mm thick; stem 30–70 cm high, single, straight, thinly sulcate, simple or slightly branching; radical leaves early withering, lower leaves on 4–6 cm long petioles, their blades oblong-ovate, bi- or tripinnate, 5–12 cm long, 3–7 cm wide; primary lobes opposite, sessile; lobes of the last order ovate, deeply cut into linear acuminate lobules, 1.5–3.5 mm long and ca. 0.5 mm wide. Umbels 4–10 cm across, of 10–15 glabrous rays; involucre of 1–3 leaflets; involucels multifoliate, of lanceolate acute leaflets with white-scarious margin; sepals developed as inconspicuous teeth; petals white; fruit ovoid, ca. 2 mm long, 1.5 mm wide. July. (Plate XXVI, Figure 1.)

Slopes of meadows, weed of crops. — W. Siberia: Alt. (east of Katun); E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Ze.-Bu., Uda?, Uss. Gen. distr.: Manchuria, Mong., N. Ch. Described from Buryat-Mongolia. Type in Leningrad.

Genus 1007.* **BUNIUM**** L.

L. Sp. pl. (1753) 243. — *Symphodium* C. Koch in Linnaea, XVI (1842) 356. — *Bunium* sect. *Leucobunium* Calest. in Webbia, I (1905) 275

Flowers bisexual or unisexual, petals of outer flowers somewhat larger, white or slightly purple, obcordate, concave, with inward turned tip, calyx edentulate; stylopodium flattened, pulvinate or conical; styles straight or curved outward; fruit compressed laterally, linear-oblong to ovoid,

* Treatment by E. P. Korovin.

** From the Greek *bunion* — Dioscorides' name for tuberous umbellifers.

always glabrous, mericarps with more or less wide commissure, ribs developed as protruding striae or wider ridges, resinous canals single or ternate between ribs, 2 toward commissure; carpophore free or adnate to mericarps; mesocarp dense, microcellular, stereomes in shape of cylindrical or flattened columns running along ribs; seeds flat or with 2 shallow furrows toward commissure. Perennial plants, with deeply hidden hypocotyl tuber, radical leaves long-petioled, with pinnatisect blade, involucre and involucels very variable.

397 *Bunium* L. should include *Conopodium* Koch., distinguished only by its seeds, which have two shallow furrows. In shape of its fruit the latter closely resembles some species of *Bunium* L., section *Elwendia* Boiss. The genus comprises 39 species throughout the Mediterranean area, the Crimea, Caucasus and Central Asia, to the mountains of Tien Shan.

Economic importance. Data on practical importance are limited to a report on a single species, *B. persicum* (Boiss.) B. Fedtsch., the tubers of which are eaten fresh in Afghanistan.

1. Styles straight, hardening during ripening 2.
- + Styles curved outward or spreading, not hardening in fruit 3.
2. All leaves more or less equal, their terminal parts elongate, fruit oblong-linear, 5 mm long; resinous canals wide 4. *B. capusii* (Franch.) Korov.
- + Radical leaves many times cut into short sections, which are elongate in cauline leaves; fruit linear, 6 mm long; resinous canals narrow 1. *B. gypsaceum* Korov.
3. Petals oblong, 2-lobed to middle, directed forward, long persistent on ovary; styles long 4.
- + Petals always recurved, obovate, rapidly deciduous; styles short . . . 5.
4. Umbels 3-6-rayed, ca. 20 mm across, with small involucre; fruit oblong-ovoid; petals 1 mm long 6. *B. paucifolium* DC.
- + Umbels 10-20-rayed, twice as large, with well developed involucre and involucel; fruit oblong-ovoid; petals twice as large 5. *B. elegans* (Fenzl) Freyn.
5. Leaves with broad sheaths set off from petiole 2. *B. vaginatum* Korov.
- + Leaves with narrow sheaths gradually passing to petioles 6.
6. Fruit oval in profile 7. *B. angreni* Korov.
- + Fruit usually elongate, sometimes cylindrical, rarely tapering at base 7.
7. Leaves on stem with reflexed segments 8.
- + Leaf segments straight, not fragmented 9.
8. Fruit splitting above, persistent on pedicel; styles nearly as long as stylopodium 3. *B. chaerophylloides* (Rgl. et Schmalh.) Drude.
- + Fruit normally splitting below; styles $\frac{1}{3}$ the length of the stylopodium 9. *B. seravschanicum* Korov.
- 398 9. Fruiting pedicels thin 10.
- + Fruiting pedicels thickened, sometimes as thick as fruit 17.

10. Fruiting pedicels more than twice as long as fruit 8. *B. persicum* (Boiss.) B. Fedtsch.
- + Pedicels as long as or twice as long as fruit 11.
11. Branches under umbels, umbel rays and pedicels acutely ribbed, scabrous 12. *B. scabrellum* Korov.
- + All parts of plant completely smooth 12.
12. Umbels of up to 20 rays; radical and cauline leaves sharply different 13.
- + Umbels not exceeding 10 rays; leaves only slightly different from each other 14.
13. Involucre absent 11. *B. hissaricum* Korov.
- + Involucre present 10. *B. intermedium* Korov.
14. Petals 1.8 mm long, with distinct claw; stylopodium usually flat or concave 13. *B. ferulaceum* Sibth. et Sm.
- + Petals not longer than 1.3 mm; stylopodium short-conical 15.
15. Umbels of 5–10 unequal rays; plant 20–40 cm high 16.
- + Umbels of 3–5 equal rays; plant 10–15 cm high 15. *B. kuhitangi* Nevski.
16. Fruit 4–5 mm long, oblong 14. *B. longipes* Freyn.
- + Fruit 2–2.5 mm long, oblong-ovoid 16. *B. bourgaei* (Boiss.) Freyn et Sint.
17. Stem in upper part angular; fruit cylindrical, 6–7 mm long; pedicels as thick as fruit 17. *B. badghysi* Korov.
- + Stem rounded; fruit shorter 18. *B. cylindricum* (Boiss. et Hoh.) Drude.

Section 1. *ELWENDIA* (Boiss.) Wolff in Pflanzenr. IV, 228 (1927) 207.—
 Gen. *Elwendia* Boiss. in Ann. Sc. nat. 3 sér. Bot. I (1844) 140.—
 Mericarps and carpophore, fused in ripe fruit, at least proximally.

1. *B. gypsaceum* Korov. in Bot. mat. Gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 25.

Perennial; glaucescent, entirely glabrous plant; tuber spherical or ovoid, ca. 10 mm across; stem rounded, obscurely furrowed, spreading-
 399 branching from base, 20–30 cm high; branches often reaching level of central umbel; lower cauline leaves on short oblong sheaths, with decurrent lateral segments; blades broadly triangular, quadripinnatisect into linear acute, 4 mm long, 0.5 mm wide spreading lobules, the median ternate, their primary segments bipinnatisect into longer, straight, linear, acuminate, upright, linear, 25 mm long lobules, the upper reduced to 1 lobule. Umbels without involucre, of 4–6, 3–4 cm long rays turned to one side; umbellets 10–15-flowered, with involucre of 3–6 unequal, linear, acuminate leaflets shorter than pedicels; petals not equal, obcordate, to 2 mm long in peripheral flowers, 1 mm in inner flowers, slightly notched, with short acute inward curved tip; stylopodium conical, passing into 1.5 mm long straight, divergent, later upright styles; fruit slightly longer than thickened pedicels, compressed laterally, linear, curved, slightly tapering in upper part, 6 mm long, 1.3 mm wide, mericarps pentagonal in cross section, with sharply protruding filiform ribs; resinous canals narrow, single. May–June.

Loose products of weathered limestones, marl and gypsiferous rocks. — Centr. Asia: Pam.-Al. (western spur of Gissar Range). Endemic. Described from Baisun-Tau. Type in Tashkent.

Note. The closest relative of this species is *B. capusii* (Franch.) Korov., a plant of the foothill plains growing on loess deposits, distinguished mainly by the shape of its leaves.

2. *B. vaginatum* Korov. in Byull. Sredneaz. Gos. univ. XV (1927) 122. — Ic.: Korov., *ibid.*, tabl. VI.

Perennial; glaucescent, pale green, entirely glabrous plant; tuber spherical, to 2 cm across; to 25 cm high, distinctly furrowed, straight or with 1–2 branches above stem, sometimes pink; radical leaves long-petioled; their blades broadly triangular with deeply bipinnatifid sections; last-order lobules, 10 mm long, 1 mm wide, with short mucro; cauline leaves with shortened, finely dissected blade on broad amplexicaul oval-lanceolate, shiny decurrent sheath embracing stem, to 30 mm long, 12 mm wide; uppermost leaves reduced to short lanceolate scale. Umbels without involucre, of 5–10, 3–5 cm long, unequal rays; umbellets 15–20-flowered, with sterile central flowers; involucre absent or to 6 short narrowly lanceolate unequal reflexed leaflets; calyx edentulate; petals 1.5 mm long, smaller in inner flowers, obcordate, notched, with acute inward curved tip; stylopodium distinctly flattened; styles twice as long as diameter of stylopodium, curved outside; fruit oblong-ovoid, 3 mm long, $\frac{1}{3}$ the length of the unthickened pedicels; mericarps rounded in cross section, dorsally with slightly protruding ribs and resinous canals; mericarps and carpophore fused; resinous tubes single, broad. May–June.

Stony slopes, lower mountain belt. — Centr. Asia: T. Sh. (Kara-Tau Mountains, Talass Ala-Tau in western part of Range). Endemic. Described from Kara-Tau Mountains. Type in Tashkent.

3. *B. chaerophylloides* (Rgl. et Schmalh.) Drude in E. — P. Pflanzenfam. III, 8 (1898) 194; Korov. in Byull. Sredneaz. Gos. univ. XV (1927) 125. — *Carum chaerophylloides* Rgl. et Schmalh. in Tr. Bot. Sada, V (1877) 585. — *C. sogdianum* Lipsky, *ibid.*, XXIII (1904) 118. — *C. confusum* O. Fedtsch. in A. P. Fedchenko, Puteshestv. v. Turkest. vyp. 24 (1902) 166, nom. — *B. persicum* K. — Pol. in Spiske rast. russk. fl. VIII (1928) 108, non B. Fedtsch. (1915). — *B. sogdianum* Wolff in Engl. Pflanzenr. IV, 228 (1927) 209. — Exs.: G. R. F. No. 2607.

Perennial; entirely glabrous green plant; tuber spherical, sometimes with short cylindrical neck; stem 50–70 cm high, rounded, hollow, thinly furrowed, usually branching from middle, branches divergent; radical leaves long-petioled, their blades triangular-oval, tripinnatisect into 3-partite sections with to 10 mm long, 2 mm wide lanceolate terminal lobules, cauline leaves sessile or short-petiolate, with lanceolate, scarious-rimmed sheaths, their segments typically reflexed, upper leaves with few linear elongate sections. Umbels of 10–16 rays, flat above, their inner rays shorter, 3–5 cm long; involucre mostly absent, rarely of a few filiform caducous leaflets; umbellets of 20–25 flowers, nearly all bisexual; involucre not developed; calyx edentulate; petals broadly obovate, slightly notched, with broad inward curved tip, inner petals 1.5 mm long, shorter than the peripheral; stylopodium flattened-conical; styles short, curved

outward; fruit 4–4.5 mm long, oblong-linear, distinctly tapering at base, sometimes curved, one-third to one-half the length of the thin pedicels; mericarps with narrow commissure, separating above on ripening, persistent; carpophore adnate to mericarps; ribs filiform, inflated; resinous canals single in valliculae, narrow, protruding at surface; seeds flat toward commissure. April–May.

Gently sloping mountains, steppe and semidesert belt. — Centr. Asia: T. Sh. (mountains of Kara-Tau, Tashkent Ala-Tau), Pam.-Al. (Zeravshan and Gissar Range), Mtn. Turkm. (Badkhyz). Gen. distr.: Iran. (N. Afghanistan). Described from the mountains of Kara-Tau, Mogol-Tau, and others. Type in Leningrad.

Note. The characteristic feature of this species is the narrow commissure, which separates above, not below. Also typical is the shape of the fruit, which tapers proximally, not distally, like other species. We might add that the petals are rounded, not cuneate. In view of these characters, it is doubtful whether this species should be included in *Bunium*.

Section 2. *BULBOCASTANUM* (Adans.) DC. Prodr. IV (1830) 115. — Gen. *Bulbocastanum* Adans. Fam. II (1765) 95. — *Bunium* sect. *Caroides* DC. Coll. Mém. Ombell. (1829) 41. — *Carum* sect. II *Bulbocastanum* Koch, Synops. (1837) 286. — *Bunium* Sect. I *Leucobunium* Calest. in *Webbia*, I (1905) 275. — Ripe mericarps separate easily from each other and from carpophore.

4. *B. capusii* (Franch.) Korov. in Byull. Sredneaz. Gos. univ. XV (1927) 126; Wolff in Engl. Pflanzenr. IV, 228 (1927) 195. — *B. turkestanicum* Wolff, ibid. 210. — *Carum capusii* Franch. in Ann. Sc. Nat. 6 sér. XVI (1883) 293. — *C. turkestanicum* Lipsky in Tr. Bot. Sada, XXIII (1904) 114. — *C. elegans* Rgl., ibid., V (1877) 586, non Fenzl (1842). — *C. gracile* Zinger in Tr. Yur'evsk. Bot. sada, II (1901) 162.

Perennial; plant entirely glabrous; tuber spherical, ca. 10 mm across, long retaining last year's leaves; stem 25–35 cm high, single, thinly furrowed, branching at middle with equal branches; radical leaves long-petioled, their blades triangular, thrice ternate-dissected into narrowly linear acute, ca. 15 mm long lobules diverging at an acute angle; cauline leaves on short narrowly lanceolate sheaths, terminal lobules straight, to 4 cm long; upper leaves reduced. Umbels without involucre or with 1–2 linear-subulate leaflets, of 6–12, often 8 spreading more or less equal 2–3.5 cm long rays; umbellets 15–20-flowered; involucre of 5–8 unequal linear-subulate leaflets; inner flowers staminate or abortive; calyx edentulate; petals unequal, the peripheral to 1.8 mm long, obcordate, notched, with short inward curved tip; stylopodium short-conical, contracted at base, passing into straight upright 1.8 mm long style; fruit oblong-linear, curved outward, about as long as pedicels, to 5 mm; mericarps pentagonal in cross section with broad commissure, separating from each other and from carpophore when ripe; ribs filiform, inflated, hence fruit furrowed; resinous canals single, broad; seeds flat toward commissure. May–June.

402 Among ephemeral cover, in desert loess plains, also low loess foothills. — Centr. Asia: T. Sh. (W. T. Sh.), Syr D., Pam.-Al. Endemic. Described from Dzhizak and Shakhriyabz. Type in Geneva.

5. *B. elegans* (Fenzl) Freyn in Oest. Bot. Zeitschr. XIII (1892) 83. — *B. noeanum* (Boiss.) G. Woron. in Grossg., Fl. Kavk. III (1932) 158. — *Carum elegans* Fenzl, Pugill. pl. nov. (1842) 16; Boiss. Fl. or. II, 883. — *C. noeanum* Boiss. Diagn. ser. 2, II (1856) 77. — *C. falcarioides* Boiss. et Buhse in Nouv. Mém. Soc. Bot. Mosc. XII (1860) 96. — *C. purpurascens* Boiss. in Tchihat. As. Min. Bot. I (1860) 411. — *Sympodium simplex* C. Koch in Linn. XVI (1842) 336.

Perennial; pale green, entirely glabrous plant; tuber spherical, to 15 mm across; stem 30–40 cm high, cylindrical below, thinly furrowed, curved-angular above, straight or more or less curved in nodes, branching from middle or in upper part, rarely from base, radical leaves long-petioled, their blade oval-triangular, bipinnatisect, its segments pinnatipartite into narrowly linear divergent lobules; lower cauline leaves on shortened pedicels, the median and upper leaves sessile on narrow, lanceolate, amplexicaul sheaths, their blade tripinnatisect into narrow linear, straight, 20 mm long, 0.5 mm wide, acute sections, longer and narrower in upper leaves. Umbels of 10–13, rarely 21 acutely angled, nearly equal, 20–30 mm long rays; involucre of 5–9 linear-subulate, membranous-rimmed leaflets one-third to one-half the length of the umbel rays; umbellets 15–20-flowered, with involucels of 6–9 linear-subulate leaflets as long as or half as long as pedicels; calyx edentulate; petals white or pale purple, typically antrorse, oblong-oval, concave to middle and thus 2-lobed, with inward curved tip, 2 mm long; stylopodium appearing like two thickened cushions; styles thin, long, 2 mm long in fruit, curved outward; fruit oblong-linear, shorter than pedicels, 4 mm long; mericarps subcylindrical, separating from each other and from carpophore when ripe; ribs filiform, especially prominent at apex of fruit; resinous canals single between ribs, 2 toward commissure. Fl. July, Fr. August.

Steppe slopes of mountains, central to subalpine belts, also in fields. — Caucasus: S. and W. Transc. (rarely). Gen. distr.: Arm.-Kurd., E. Med. Described from Aleppo. Type in Berlin.

Note. This species is inconstant in many respects, even within the USSR, varying in the character of branching, the structure of umbels, number of involucre and involucel leaflets, color of petals, and shape of leaves.

403 Similar variations have been reported from outside the Soviet Union. Available material makes it possible to separate the following varieties: var. *purpurascens* (Boiss.) Korov. — flowers, involucre and involucels purple; var. *typicum* Wolff (l. c. 189) — stem twisted, furcately branching from base; var. *noeanum* Boiss. (l. c.) — stem straight, flowers white, fruit narrow oblong-linear. Further study should throw much more light on the variability of this species.

6. *B. paucifolium* DC. Prodr. IV (1830) 117. — *B. cassium* Boiss. Diagn. ser. II, 2 (1856) 77. — *B. filipes* Freyn et Contrath in Bull. Herb. Boiss. III (1895) 305. — *Carum elegans* Fenzl γ. *junceum* Boiss. Fl. or. II (1872) 884.

Perennial; pale green, glaucescent, entirely glabrous plant; tuber spherical, ca. 10 mm across; stem 70–100 cm high, cylindrical, thinly furrowed, straight, curved only in upper part in nodes, branching at middle to produce spreading panicle; lower cauline leaves with long petioles, their blade broadly triangular, bipinnatisect, its segments deeply parted into 15 mm long, 2 mm wide linear sections, with single nerve; median cauline leaves with narrowly lanceolate sheaths, their blade twice ternate-dissected into long linear, to 2 mm wide, 6 cm long sections; upper leaves of 1–3 narrower sections. Umbels of 3–6 thin rays, often not longer than 10 cm; involucre of 3–5 short linear-subulate leaflets; umbellets 8–12-flowered, their involucels of 5 linear-subulate leaflets, as long as pedicels or shorter; calyx edentulate; petals antrorse, white or pink, broadly oval, concave, with inward curved tip, 1 mm long; stylopodium flattened, notched; styles thin, 1.8 mm long; fruit oblong-ovoid, 2.5–3 mm long, as long as or $\frac{2}{3}$ as long as pedicels; mericarps subcylindrical, separating from each other and from carpophore when ripe; ribs filiform; resinous canals single between ribs; 2 toward commissure. Fl. July, Fr. September.

Grassy mountain slopes, sometimes in forests. — Caucasus: S. and E. Transc. (rarely). Gen. distr.: Iran., Arm.-Kurd., E. Med. Described from Iran. Type in Geneva.

Note. This species differs from the preceding by impoverished umbels, few-leaved involucre, small petals, wider fruit, greater height of the plants and larger size and broader sections of leaves. The Syrian plants are very similar to the Caucasian.

404 7. *B. angreni* Korov. in Byull. Sredneaz. Gos. univ. XV (1924) 123.

Perennial; plant entirely glabrous; tuber spherical; stem to 15 cm high, single or 2–3, thin, slightly furrowed, spreading-branching from middle or above base, with equidimensional branches; radical leaves on short petioles, their blade broadly triangular, ternately dissected, the segments bipinnatisect into linear-lanceolate, obtuse, to 10 mm long lobules; cauline leaves sessile, of straight, spreading, setiform 10 mm long lobules; upper leaves smaller. Umbels without involucre, of 2–5, 15–20 mm long rays; involucels of umbellets absent or of 1–3 elongate filiform leaflets; pedicels spreading, becoming more or less compressed; calyx edentulate; petals unequal, 1–2 mm long, the peripheral larger than the inner, obcordate, notched, with short acute inward curved tip, stylopodium pulvinate; styles short, curved outward; fruit ellipsoid, much shorter than pedicels, 2.2 mm long; mericarps slightly compressed dorsally, broadly cohesive, separating from each other and from carpophore, their ribs broad, inflated; resinous canals single, broad, protruding on surface of fruit; seeds with 2 shallow furrows toward commissure. July–August.

Stony mountain slopes, alpine belt. — Centr. Asia: T. Sh. Endemic. Described from Angren River. Type in Tashkent.

8. *B. persicum* (Boiss.) B. Fedtsch., Rastit. Turkest. (1915) 612; Korov. in Byull. Sredneaz. Gos. univ. XV (1927) 124; Wolff in Engl. Pflanzenr. IV, 228 (1927) 198. — *Carum persicum* Boiss. in Ann. Sc. Nat. 3 sér. Bot. (1844) 138 et in Fl. or. II (1872) 844; Lipskii in Tr. Bot. Sada, XXIII (1904) 116. — *C. heterophyllum* Rgl. et Schm. in Tr. Bot. Sada, V (1878) 586 and in Izv. Obshch. lyub. estestv.,

antrop. i etnogr. XXXIV, 2 (1882) 27.— *C. bulbocastanum* var. *heterophyllum* O. Ktze. in Tr. Bot. Sada, X (1887) 190.

Perennial; pale green, entirely glabrous plant; tuber irregularly spherical; stem 40–60 cm high, furrowed, straight, corymbiformly branching from middle, branches declinate; radical leaves long-petioled, their blade broadly triangular, ternate, its segments long-petioluled, the leaves spreading, bipinnatisect into oval pinnatipartite sections, with lanceolate ca. 2 mm long, cuneate, mucronate lobules; cauline leaves sessile on short sheaths, bipinnatisect into straight spreading filiform lobules to 20 mm long, the upper leaves reduced to few filiform lobules. Umbels to 15 cm across, of 15–20 rays usually all spreading; involucre absent or of 1–2 short, linear leaflets; umbellets 20–30-flowered; pedicels irregular, erect, filiform, remaining filiform in fruit; involucels of many (6–10) lanceolate, cuneate-acuminate, spreading leaflets; all flowers fertile; calyx edentulate; petals equal, broadly oval, notched for half their length, with inward curved tip, 1 mm long; stylopodium flattened-pulviniform; styles thin, curved outward, as long as stylopodium is wide; fruit linear, 4 mm long, much shorter than thin pedicels; ripe mericarps separating from each other and from carpophore, pentahedral, with prominent filiform ribs; resinous canals 1 between ribs; seeds slightly concave toward commissure. June–July.

Gentle exposed mountain slopes, central belt. — Centr. Asia: T. Sh. (Kara-Tau Mountains, Turkestan Range), Pam.-Al. (Zeravshan, Gissar, Alai ranges, Darvaza, Peter the Great Range), Mtn. Turkm. Gen. distr.: Iran., Arm.-Kurd., Ind.-Him. (Kashmir). Described from Persia. Type in Geneva.

9. *B. seravschanicum* Korov. in Byull. Sredneaz. Gos. univ. XV (1927) 125.

Perennial; plant entirely glabrous; tuber spherical; stems about 30 cm high, branching from middle or slightly below; lower cauline leaves triangular, twice ternate-dissected, their segments spreading; upper leaves reduced, their lobules narrowly lanceolate-linear, reflexed below. Umbels of 4–8 rays 4–5 cm across, often without involucre; umbellets 15-flowered, with involucels of 3–4 unequal narrowly linear leaflets; calyx edentulate; petals broadly obovate, with inward curved tip, longer in outer peripheral flowers than in inner; stylopodium flattened; styles curved outside, twice as long as stylopodium; fruit (unripe) oblong-ovoid, with distinctly protruding ribs; resinous canals single. June–August.

Mountain slopes, 2,000–3,000 m. Centr. Asia: Pam.-Al. (Zeravshan Range, Roshan). Endemic. Described from Zeravshan Range. Type in Tashkent.

Note. In the shape of its leaves this species most nearly resembles *B. chaerophylloides* (Rgl. et Schm.) Drude, from which it is well differentiated by the structure of the fruit and the elongated styles. As it was established on the basis of limited material, it requires further study.

10. *B. intermedium* Korov. in Bot. mat. Gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 26.

Perennial; plant entirely glabrous; tuber spherical, to 20 m across; stem 30–45 cm high, hollow, thinly sulcate, slightly twisted, slightly branching at middle, branches declinate, not overtopping central umbel; radical

and lower cauline leaves broadly triangular, with ternate blade, segments pinnatisect into oval, pinnatipartite, lanceolate, obtuse ca. 5 mm long lobules; upper cauline leaves sessile, with elongate, filiform, acute, straight, spreading, to 15 mm long lobules. Umbels of 5–9 (rarely to 20) unequal rays, the outer longer than the inner, 3 to 6 cm long; involucre absent or of few elongate linear-subulate leaflets usually dissected to base; umbellets 15–20-flowered; involucels of few (1–6) unequal linear-subulate leaflets as long as pedicels; petals obcordate, nearly equal, 1.6–1.8 mm long; stylopodium flattened; styles $\frac{1}{3}$ the length of the stylopodium, curved outward; fruit brown, oblong-linear, laterally compressed, half as long as unthickened pedicels, 4–4.5 mm long; mericarps cylindrical-tetragonal, ribs wide, inflated; resinous canals narrow, protruding. May – June – July.

Gentle herbaceous mountain slopes, Central Asian juniper belt, usually in shady habitats. — Centr. Asia: Pam.-Al. (Turkestan and Gissar ranges). Endemic. Described from Turkestan Range. Type in Tashkent.

Note. In its heterophylly this species is reminiscent of *B. persicum* (Boiss.) B. Fedtsch., from which it is distinguished by the reduced pedicels. The fruit, too, is typical.

11. *B. hissaricum* Korov. in Bot. mat. Gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 27.

Perennial; tuber spherical; stem 30–50 cm high, cylindrical, with white longitudinal striae, more or less curved, branching at middle or below, branches sometimes overtopping terminal umbel; leaves glaucescent, the radical with broadly triangular, ternate-dissected blade, segments tripinnatisect into pinnatipartite sections with linear-lanceolate acute, 2–3 mm long lobules; cauline leaves on oblong sheaths, with membranous margins, lobules filiform, straight, ca. 10 mm long. Umbels of 10–20 unequal 4–6 cm long rays, without involucre; umbellets 15–20-flowered; involucels of 10 filiform persistent leaflets usually with scabrous margin; flowers on thin unequal pedicels; calyx edentulate; petals nearly quadrate, concave, 1 mm long; stylopodium flattened-conical; styles reflexed, as long as stylopodium is wide; fruit short-cylindrical, 3–3.5 mm long, shorter than pedicels; ribs filiform; resinous canals single between ribs. June.

407 Stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Tadshirkaya Mountain (Gissar Range). Type in Tashkent.

12. *B. scabrellum* Korov. in Addenda XV, 431.

Perennial; pale green plant, scabrous in upper part; tuber spherical, 10 mm across; stem ca. 30 cm high, cylindrical below, hollow, twisted, sulcate, higher up angular, at apex acutely ribbed, branching below middle; radical leaves with broadly spreading pairs of segments, bipinnatisect into oblong-linear lobules to 10 mm long, 3 mm wide; lower cauline leaves similar, median and upper leaves on narrow lanceolate-linear sheaths, their blade of 1–3 elongate, linear, to 4 cm long sections tapering at base. Umbels on long pedicels, scabrous above, of 5–8 unequal, 10–20 mm long, acutely ribbed, scabrous rays; involucres of 1–4 linear-subulate, unequal, nearly membranous leaflets; umbellets 10–13-flowered, spreading, with involucels of 5 linear-subulate leaflets the length of the pedicels; flowers declinous, the inner staminate, the outer bisexual; calyx edentulate;

petals white, obcordate, with inward curved tip, 1 mm long; stylopodium short-conical; styles curved horizontally, as long as stylopodium is wide; fruit oblong, 2.5 mm long, as long as thin pedicels; mericarps subcylindrical; ribs filiform; resinous canals single between ribs, 2 toward commissure side. Fr. August.

Rocky cliffs, 2,200 m. — Caucasus: Tal. (Zuvand). Endemic. Described from Lenkoran. Type in Leningrad.

Note. This species is characterized by its hollow stem ribbed above, scabrous pedicels and conical stylopodium. It was first collected by Hohenacker and Meyer, later by Shipchinskii.

13. *B. ferulaceum* Sibth. et Sm. Prodr. I (1806) 186. — *B. ferulaefolium* Desf. in Ann. Mus. Par. XI (1808) 275. — *B. majus* M. B. Fl. taur.-cauc. I (1808) 210, non Guan. — *Carum ferulaefolium* Boiss. Diagn. ser. I, 10 (1849) 22.

408 Perennial; plant entirely glabrous; tuber ovoid, to 2 cm long; stem 20–30 cm high, cylindrical, usually obtusely angular, thinly sulcate, twisted, furcately branching above base; radical leaves with thin petioles, their blades triangular-oval, tripinnatisect into linear 10 mm long, 1.2 mm wide lobules; cauline leaves with lanceolate-linear sheaths, their lobules longer and narrower. Umbels of 5–8, 3–5 cm long rays, without involucre; umbellets 15-flowered, with involucels of 3–5 lanceolate-linear leaflets, arranged singly, half as long as longest pedicels; pedicels thin, distinctly thickened, spreading in fruit, the inner much shorter than the outer; calyx edentulate; petals broadly obovate, with distinct claw, concave, with inward curved obtuse tip, 1.8 mm long; stylopodium flattened, sometimes concave; styles as long as stylopodium is wide, reflexed, stigmas capitate; fruit oblong, half the length of the longest pedicels, 4 mm long; mericarps separating from each other and from carpophore when ripe; ribs filiform, inflated; canals single between ribs, narrow, 2 toward commissure. May–July.

Exposed stony mountain slopes in the forest belt. — European part: Crim. Gen. distr.: Med. Described from Greece. Type in London.

Note. This species is close to *B. bulbocastanum* L., from which it is distinguished by the few-leaved involucels. From the USSR there are known only forms close to var. *brachycarpum* Boiss. (Fl. or. l. c. 886), distinguished from the typical form by thin pedicels.

14. *B. longipes* Freyn in Bull. d. l'Herb. Boiss. 2 sér. VI (1906) 214; Korov. in Byull. Sredneaz. Gos. univ. XV (1927) 123. — *B. cylindricum* subsp. *longipes* Wolff in Engl. Pflanzenr. IV, 228 (1927) 193.

Perennial; pale green, entirely glabrous plant; tuber spherical, ca. 20 mm across; stem 30–40 cm high, corymbiformly branching in upper part; radical leaves broadly triangular, twice ternate-dissected, terminal sections pinnatipartite into oblong-lanceolate, to 7 mm long lobules; cauline leaves with narrower, more elongate, straight, filiform, spreading, to 10 mm long lobules. Umbels of 5–8 rays, the inner shorter than the outer; involucre of 1–3 narrow leaflets; umbellets 6–15-flowered; pedicels of varying lengths; involucels of 1–4-leaved lanceolate-linear leaflets; calyx edentulate; petals broadly obovate, notched, with short inward curved tip;

stylopodium flattened; styles short, curved outwards; fruit oblong-linear, 4–5 mm long, 2–2.5 mm wide, $\frac{1}{3}$ the length of the pedicels; mericarps subcircular in cross section; ribs filiform, sharply protruding; canals single between ribs, broad; seeds nearly flat toward commissure. April–May.

Mountain slopes in lower belt. — Centr. Asia: Mtn. Turkm. (W. Kopet-Dagh). Endemic. Described from Kara-Kala and Gyaurs. Type in Vienna.

409 Note. The species closest to this are *B. kuhitangi* Nevski and *B. cylindricum* (Boiss. et Hoh.) Drude. Freyn proposes three varieties: var. *minus* Freyn, var. *brachycarpum* Freyn and var. *ellipsoideum* Freyn, distinguished by the shape and dimensions of the fruit.

15. *B. kuhitangi* Nevski in Tr. Bot. Inst. AN SSSR, ser. 1, IV (1937) 274. — *B. longipes* var. *depressum* Korov. in Byull. Sredneaz. Gos. univ. XV (1927) 124. — *B. cylindricum* var. *minor* Freyn in Bull. Herb. Boiss. 2 sér. VI (1906) 214. — *B. longipes* var. *ellipsoideum* Freyn, l. c.

Perennial; plant entirely glabrous; tuber spherical, ca. 10 mm across; stem 10–15 cm high, single, rarely 2, thinly sulcate, spreading-branching nearly from base; radical leaves short-petioled, their blade broadly triangular, ternate-dissected, segments bipinnatisect into linear-lanceolate, obtuse, 5–8 mm long, 1 mm wide lobules; cauline leaves on short oblong sheaths with scarious margin, their blade ternate-dissected, with linear or narrowly lanceolate, not more than 5 mm long lobules. Umbels of 2–5 spreading, more or less regular rays, without, rarely with 1-leaved involucre; umbellets 8–10-flowered; involucre of 1–3 linear leaflets; inner flowers sterile; calyx edentulate; petals of varying dimensions, in peripheral flowers broadly obovate, acuminate with inward curved tip, 1.2 mm long; fruit oblong-ovoid, more or less equal to pedicels, 4 mm long, the outer pedicels slightly curved; mericarps subcircular in cross section, their ribs filiform, whitish; resinous canals single between ribs, broad; seeds flat toward commissure. June–July.

Soft slopes in subalpine and alpine mountain belts. — Centr. Asia: Pam.-Al. (Kugitang Mountains). Endemic. Described from Kugitang. Type in Leningrad.

16. *B. bourgaei* (Boiss.) Freyn et Sint. in Oest. Bot. Zeit. XLIV (1894) 99; Wolff in Engl. Pflanzenr. IV, 224 (1927) 194. — *Carum Bourgaei* Boiss. Fl. or. II (1872) 885.

410 Perennial; glaucescent, entirely glabrous plant; tuber spherical, 10–15 across; stem 20–30 cm high, rounded, thinly sulcate, furcately branching from base or above; radical leaves with oval blade, tripinnatisect into linear, 5–10 mm long, 1 mm wide lobules; cauline leaves sessile on narrowly lanceolate sheaths with scarious margins, with short, narrower linear-filiform lobules. Umbels of 8–10 unequal, 10–25 mm long, spreading rays, usually without involucre, rarely with few deciduous leaflets; umbellets 10–13-flowered, distinctly compressed below, with involucre of several lanceolate-linear, scarious leaflets, varying in number, rarely involucre not developed; flowers on unequal pedicels; calyx edentulate;

petals broadly obovate, concave, with notched inward curved tip, 1–1.3 mm long; stylopodium flattened; styles slightly longer than stylopodium is wide; fruit oblong or oblong-ovoid, as long as the slightly thickened pedicels, 2–2.5 mm; ribs sharply protruding; resinous canals single between ribs, inflated, 2 toward commissure. Fl. June, Fr. July.

Steppe slopes, rarely in mountain belts. — Caucasus: W., S. and E. Transc. Gen. distr.: Iran., Arm.-Kurd., As. Min. Described from Gyumyushkhan and Dzhimil. Type in Geneva.

Note. This species is variable in several characters. Alongside the typical forms, which branch from base, there are plants with erect, only slightly branching stems. The shape and size of fruit are similarly variable. In some cases the involuclers are absent (Gagrinskii massif, Voronov, No. 415). The small-fruited forms are very much like *B. microcarpum* (Boiss.) Freyn et Sint. (l. c.) from which it can be distinguished with great difficulty by its shorter lobules. *B. temskyannum* Freyn et Sint. (Bull. d. l'Herb. Boiss. III (1895) 304 is in the same relation to the present species, and probably is only a variety, like the preceding species. Two known varieties occur in the Soviet flora: var. *huettii* Boiss., without involucre, and var. *cataonicum* Boiss. (l. c.), with few-leaved involuclers.

17. *B. badghysi* Korov. comb. nov. — *B. cylindricum* ssp. *badghysi* Korov. in Byull. Sredneaz. Gos. univ. XV (1927) 127.

Perennial; plant pale green, entirely glabrous; tuber spherical, ca. 20 mm across; stem 30–50 cm long, single, rarely 2, sulcate, angular above, branching from middle, erect or curved at nodes; radical leaves long-petioled, their blade broadly triangular, ternate-dissected, with segments bipinnatisect into lanceolate, trifid or parted, 3–5 mm long sections; lobules lanceolate, acute, 2–3 mm long, 1–2 mm wide; cauline leaves sessile, with reduced oblong sheaths and smaller and narrower lobules. Umbels of 6–10 unequal rays 3–7 cm long, involucre of 1–4 lanceolate, nearly membranous leaflets; umbellets 10–15-flowered; flowers all fertile; 411 pedicels of varying length, thickened, spreading in fruit; involucre 5–6-leaved; leaflets lanceolate, membranous, shorter than umbel; calyx edentulate; petals equal, obovate, with short inward curved tip, 1.5 mm long; stylopodium flattened-pulviniform; fruit linear-cylindrical, slightly curved or straight, 6–7 mm long, about as long as pedicels; mericarps furrowed outside, with prominent filiform ribs; resinous canals single between ribs; seeds flat toward commissure. April–May.

Sandy hills, rarely stony slopes in mountain-semidesert belt. — Centr. Asia; Mtn. Turkm. Endemic. Described from Badkhiyz (Berdyklych). Type in Tashkent.

Note. This species is very close to *B. cylindricum* (Boiss.) Drude from which it differs by the more elongated fruit, multi-rayed umbels and lanceolate leaflets of involuclers.

18. *B. cylindricum* (Boiss. et Hoh.) Drude in E.—P. Pflanzenfam. III, 8 (1898) 194; Wolff in Engl. Pflanzenr. IV, 224 (1927) 192. — *B. cylindraceum* Freyn in Bull. Herb. Boiss. 2 sér. VI (1906) 214. — *B. salsum* Korov. in Bot. mat. Gerb. Glavn. Bot. Sada, V, 5 (1924) 13. — *Carum cylindricum* Boiss. et Hoh. Diagn. ser. 1, 10 (1849) 23.

Perennial; entirely glabrous glaucescent plant; tuber spherical; stem 25–30 cm high, cylindrical, slightly sulcate, twisted, branching near base, the branches more or less equal, reaching or exceeding level of axial umbel; radical leaves with broadly triangular blade, bipinnatisect into short, 3–5 mm, oblong-linear, often 2- to 3-partite lobules; lower cauline leaves on reduced petioles, the upper sessile on lanceolate-linear sheaths with scarious margins, lobules narrower, linear. Umbels of 5–10 spreading, furrowed, to 5 cm long rays, often without involucre, rarely the latter of 1–4 leaflets; umbellets 10–15-flowered, fertile, spreading, with involucels of 2–5 lanceolate leaflets nearly as long as pedicels; inner flowers of umbellets staminate, the outer bisexual; calyx edentulate; petals broadly oval, subrounded, slightly depressed, with short acute tip, 1.8 mm long; stylopodium short-conical; styles short, curved outward; fruit cylindrical, as long as or longer than thickened pedicels, 5–6 mm long; ribs inflated, forming edges; resinous canals single, 2 toward commissure. Fl. and Fr. May.

Slopes of hills, often among crops. — Caucasus: S. and E. Transc.; Centr. Asia: Pam.-Al. (Gissar Range), Syr D. (eminences in the Samarkand area), T. Sh. (Mogol-Tau Mountains). Gen. distr.: Iran. Described from Iran. Type in Geneva.

412 Genus 1008. **ZERAVSCHANIA** * Korov.

Korov. in Bot. mat. gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 28

Flowers bisexual; calyx edentulate; petals white, obcordate, impressed along midrib, with inward curved tip; stylopodium massive, cylindrical-conical, surrounded by undulant basal ridge; styles not longer than stylopodium is wide; fruit (unripe) ovoid, compressed laterally, with broad commissure and filiform dorsal, slightly dilated marginal ribs. Resinous canals single under valliculae, 2 toward commissure; seeds flat toward commissure. Perennial herbs, with leaves many times dissected into small lobules, with involucre and involucels.

One species, Central Asia.

1. *Z. regeliana* Korov., *ibid.* (1948).

Perennial; plant entirely glabrous; root 1.5–2 cm thick, multicapital, root neck densely covered with black-brown leaf remnants; stems many, 65–90 cm high, cylindrical, thinly ribbed, hollow, branching from middle or nearly from base with obliquely antrorse branches; radical leaves numerous, their petioles shorter or longer than blade, abruptly expanding to oblong-ovate sheath with scarious margins, blade ovate, 7–15 cm long, 4–7 cm wide, tripinnatisect, primary lobes sessile or on short petiolules, secondary lobes sessile, ovate, deeply dissected into triangular, acute, short, 3–4 mm long, sometimes deeply dentate lobules; cauline leaves few, smaller, less deeply cut, the lower on petioles abruptly expanding to amplexicaul sheath, the upper leaves sessile, the uppermost reduced to sheaths. Umbels 4–8 cm across, of 4–8 nearly equal glabrous rays,

* After the Zeravshan River (Central Asia), in the watershed of which the plant was discovered.

lateral umbels smaller, of 5–11 unequal rays; involucre of 7–10 oblong-lanceolate, acute leaflets with broad scarious margin; umbellets 20-flowered, 1–1.2 cm across; leaflets of involucels 7–11, oblong-lanceolate, broadly scarious, thinly acuminate, nearly as long as umbel rays or shorter; petals white, broadly ovate, attenuate at base, notched, with inward curved lobe, 2–2.3 mm long; fruit small, glabrous. June–July.

Stony slopes, 900–2,700 m. — Centr. Asia: Pam. — Al. Endemic. Described from the Zeravshan River watershed (Kshtut-Pul-i-Kalon). Type in Leningrad.

3 Genus 1009. **HYMENOLYMA*** Korov.

Korov, in Bot. mat. Gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 30

Flowers bisexual, calyx teeth inconspicuous, petals white, obovate, notched, with short inward curved acuminate lobe, stylopodium conical, styles short, divergent or recurved, fruit oblong-cylindrical, with broad commissure, mericarps with filiform ribs, 1–4 canals under vallecule, 2–10 toward commissure, pericarp coriaceous, stereomes in ribs, carpophore 2-partite. Monocarpic tuberiferous herbs, with thinly dissected leaves; involucre and involucels of membranous leaflets.

Two species, Central Asia.

1. Lower part of stem and lower leaves short-scarious; leaflets of involucels broadly obovate, entirely enclosing umbel before flowering, with 5–8 violet nerves 2. *H. bupleuroides* (Schrenk) Korov.
- + Lower part of stem and lower leaves usually glabrous; leaflets of involucels oblong, not exceeding umbel 1. *H. trichophyllum* (Schrenk) Korov.

1. *H. trichophyllum* (Schrenk) Korov. in Bot. mat. Gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 31. — *H. scariosum* Korov., ibid. (1948) 31. — *Carum trichophyllum* Schrenk, Enum. Pl. nov. I (1841) 61; Ldb. Fl. Ross. II, 250. — *Seseli scariosum* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 361; Ldb. Fl. Ross. II, 277. — *Conopodium trichophyllum* Korov. in sched. ad Herb. Fl. As. Med. I–II (1924) 25; Kryl., Fl. Zap. Sib. VIII, 2081. — *Bunium trichophyllum* Wolff in Engl. Pflanzenr. IV, 228 (1927) 210. — Exs.: H. F. A. M. No. 33.

Perennial; entire plant glabrous or subglabrous; tuber oblong, superficial, neck covered with fibrous leaf remnants; stem 30–70 cm high, single or 2, erect, with few obliquely antrorse branches in upper half; radical leaves early withering, their petiole expanding to sheath, nearly as long as blade, the blade ovate, 6–7 cm long, 3–4 mm wide, with oblong sessile primary lobes, sometimes slightly scarious, secondary lobes thinly dissected into filiform or narrowly linear, 3–5 mm long, 0.2 mm wide, acute lobules; lower cauline leaves similar to the radical, but petioles shorter (1.5–2 cm long); upper leaves sessile on sheath, less deeply cut but their

* From the Greek *hymen* — membrane, *lyma* — spot.

lobules to 2 cm long. Umbels 2–6.5 cm across, of 8–13 unequal glabrous rays; involucre of 5 oblong obtuse leaflets with broad scarious margins, several times as short as umbel rays; umbellets 20-flowered, 0.5–1 cm across; involucels of 5 almost entirely scarious oblong leaflets, shorter than umbel rays; petals broadly ovate, ca. 1 mm long; fruit 1 mm long, 1 mm wide. Fl. June, Fr. July. (Plate XXX, Figure 10.)

Artemisia semideserts, pebbly slopes. — Centr. Asia: Ar.-Casp., Balkh., Dzu-Tarb, T. Sh., Pam.-Al. Gen. distr.: Sinkiang. Described from Ak-Su River and Tarbagatai. Type in Leningrad.

2. *H. bupleuroides* (Schrenk) Korov. in Bot. mat. Gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 51. — *Carum bupleuroides* Schrenk in Bull. Phys.-Math. Ac. Pétersb. III (1845) 305; Lipsk. in Tr. Bot. Sada, XXIII (1904) 122.

Perennial; root thickened, turnip-shaped; stem base covered with leaf remnants; radical leaves early withering, their more or less long petioles expanding to sheath, their blade oblong, 5–12 cm long, 1.5–3 cm wide, tripinnatisect, with remote sessile oblong lobes of the second order, dissected in turn into lanceolate-linear, 2–3 mm long, ca. 1 mm wide, scabrous or subglabrous, acute lobules; cauline leaves sessile on short expanded amplexicaul sheaths, the leaves broadly lanceolate, tripinnatisect, into filiform-linear, 2–5 mm long, 0.1 mm wide lobules; upper leaves sessile on expanded sheath, with 5–10 mm long lobes; terminal leaves reduced, with 1–3 long, filiform lobules (3–4 cm) or reduced to sheath. Umbels of 10–15 glabrous rays; leaflets of involucre broadly obovate, scarious, nearly as long as umbellet, completely enclosing young umbel; fruit oblong, with protruding ribs; styles slightly longer than stylopodium. May–June.

Artemisia steppes, semideserts, solonetzic meadows. — Centr. Asia: Ar.-Casp., Balkh., Dzu-Tarb. (foothills of Dzungarian Ala-Tau), T. Sh., Pam.-Al. (Alai Range). Gen. distr.: Sinkiang. Described from Balkhash. Type in Leningrad.

Genus 1010. **SESELOPSIS** Schischk.

Schischk. in Mat. Gerb. Bot. inst. im. V. L. Komarova AN SSSR, XIII (1950) 159

Calyx-teeth inconspicuous; petals white or slightly reddish, obcordate, deeply notched, with short acute inward lobe curved; fruit (young) broadly ovoid, glabrous, smooth; stylopodium short-conical; styles reflexed; mericarps with 5 triangular, winglike protruding ribs; canals single under valliculae, large, 2 toward commissure; albumen pentagonal, inflated toward commissure. Biennial herbs, with tuberlike root with thickened skin.

Monotypic genus, as yet known only from Tien Shan.

1. *S. tianschanicum* Schischk. in Bot. mat. Gerb. Bot. inst. XIII (1950) 159.

Biennial; root tuberlike, thickened; entire plant glabrous, glaucescent; stem 80–100 cm high, single, erect, hollow, branching from middle; radical leaves early withering; lower cauline leaves with petioles as long as blade,

gradually expanding to oblong sheath, their blade ovate, bipinnate, 10–18 cm long, 8–15 cm wide; primary lobes of 3 petioluled pairs, dissected into few lanceolate-linear 2–8 cm long, 1–4 mm wide, acute lobules; upper leaves smaller, simple-pinnate, sessile on expanded sheath; uppermost leaves entire. Umbels 4–8 cm across, terminating stem and branches, of 8–18 unequal apically acutely scabrous rays; involucre absent; umbellets 1–1.2 cm across, of 20 rays; involucels of 4–9 narrowly linear unequal leaflets; unripe fruit 2–2.5 mm long, ca. 1.5 mm wide; styles reflexed, $1\frac{1}{2}$ times the length of the stylopodium. Second half of July–August. (Plate XXX, Figure 13.)

Stony slopes and rocks, 2,000–2,500 m. — Centr. Asia: T. Sh. Endemic. Described from Ketmen-Tau Range. Type in Leningrad.

Genus 1011.* **MURETIA** ** Boiss.

Boiss. in Ann. Sc. Nat. 3 sér. I (1844) 143

Flowers bisexual, calyx edenticulate, petals yellow, broadly ovate, tapering at apex, with inward curved tip, stylopodium flattened, with undulant margin, styles short, fruit cylindrical, linear or ovoid, smooth or with slightly protruding ribs and broadly inflated interstitial furrows, mericarps with narrow commissure, resinous canals 2–3 in each furrow, narrow, barely visible in ripe fruit, 4–6 toward commissure, carpophore parted at apex, seeds flat or slightly inflated inside, pericarp thin, stereomes developed, outer pericarp of prismatic cells. Single stemmed, monocarpic, paniculately branching, geophilous herbs, with leaves multisect into small narrow lobules.

1. Fruit ovoid, leaves dissected into long filiform lobules; plants with pungent odor 5. *M. fragrantissima* (Lipsky) K.-Pol.
- + Fruit cylindrical, linear, leaves dissected into small lobules; plant with faint odor 2.
2. Leaves mostly in rosette, stem few-leaved 4. *M. oeroilanica* Korov.
- + Leaves spaced more or less uniformly 3.
3. Terminal lobules of leaves linear-lanceolate; fruit oblong-cylindrical, brown, without distinct ribs 3. *M. transitoria* Korov.
- + Leaves dissected into narrow linear lobules 4.
4. Umbels of 5–7 thin, to 20 mm long rays, leaf lobules linear; ovary with obscure ribs; petals long persistent 1. *M. lutea* (M. B.) Boiss.
- + Umbels of 3–5, to 15 mm long, thick rays, leaf lobules narrowly linear; ovary ribbed, petals rapidly deciduous 2. *M. transcaspica* Korov.

Section 1. **ENUMERETIA** Korov. in Addenda XV, 432. — Fruit cylindrical, elongate, leaves without expanded sheaths.

* Treatment by E. P. Korovin.

** Named after the Swiss botanist Joh. Muret.

1. *M. lutea* (M.B.) Boiss. in Ann. Sc. Nat. 3 sér. I (1844) 143 et Fl. or. II (1872) 858; Shmal'g., Fl. I, 396; Korov. in Schedis ad Herb. Fl. As. Med. X (1926) 12; Wolff in Engl. Pflanzenr. IV, 228 (1927) 213. — *M. tanaicensis* Boiss. in Ann. Sc. Nat. 3 sér. I (1844) 143. — *M. aurea* Boiss. l. c. (1844). — *Bunium luteum* M. B. ex Hoffm. Umbell. Gen. (1814) 108; M. B. Fl. taur.-cauc. III (1819) 207; Ldb. Fl. Ross. II, 251. — *Sium luteum* Spreng. Sp. Umbell. (1813) 92. — *Drepanophyllum luteum* Eichw. Skizze (1831) 257. — Ic.: Fl. Yugo-Vost. V, fig. 519.

Perennial; entire plant glabrous, with oblong-ovoid tuber; stem thin, smooth, to 80 cm high, with white longitudinal striae, paniculately branching in upper part, branches spreading, with short lateral branches; leaves thin, rapidly deciduous; radical and lower cauline leaves on petioles gradually passing to amplexicaul sheath, their blade sparse, oblong-lanceolate, bipinnatisect, segments of second order deeply parted into short, 6 mm long, linear, slightly scabrous lobules; upper leaves reduced to sheath. Umbels many, on short peduncles, of 6–12, fertile compressed, to 30 mm long rays; leaf-
417 lets of involucre 5, lanceolate, membranous; umbellets 12–15-flowered, with involucre of oblong-oval curved leaflets; petals elliptic, tapering, with inward curved tip, 0.3 mm long; fruit dark brown, cylindrical, 4 mm long, with thin filiform ribs; resinous canals narrow, irregularly arranged; seeds flat toward commissure. June–July.

Steppes, sandy places, among crops. — European part: Transv., L. V., L. Don, Bl., U. Dnp., Crim.; Caucasus: Cisc.; W. Siberia: U. Tob. (S.). Endemic. Described from Krasnoarmeisk (former Sarepta). Type in Leningrad.

Economic importance. The plant seems to possess toxic properties which have not been investigated. Poisoning of sheep and cattle has occurred on pastures where the plant was growing as well as from hay.

2. *M. transcaspica* Korov. in Schedis ad H. F. A. M. fasc. X (1926) 10 (nomen); Addenda XV, 598.

Perennial; pale green slightly scabrous plant with oblong tuber; stem with white striae, to 1 m high, twice branching in panicle, branches upright; cauline leaves on short soft petioles, their blade oblong-oval, many times (3?) pinnatisect into narrow linear lobules; upper leaves reduced to short sheaths. Umbels of 3–5 unequal, to 1.5 mm long rays, with involucre of 3 oblong leaflets; umbellets small; leaflets of involucre elliptic, membranous, brown, as long as umbellets; petals broadly obovate, with acuminate inward curved tip; fruit (unripe) obcordate, furrowed; resinous canals single in furrows, broad, 3 narrow ones in ribs and 2 toward commissure. June–July.

Gentle mountain slopes, lower belt. — Centr. Asia: Mtn. Turkm. (Kopet Dag). Endemic. Described from Kopet Dag. Type in Tashkent.

3. *M. transitoria* Korov. in Bot. mat. Gerb. Gl. Bot. Sada, V (1924) 13. — Exs.: H. F. A. M. No. 238.

Perennial; plant entirely glabrous, with ovoid tuberculate tuber; stem ca. 1 m high, with white striae, leafy, spreading-branching from middle to form wide panicle, branches thin, with short lateral branches; leaves long-petioled, the upper reduced to short sheaths, blade of lower leaves oblong,

418 bipinnatisect, its secondary segments pinnapartite into linear-lanceolate, 4 mm long, 1 mm wide lobules. Umbels of 3–7 unequal, to 30 mm long rays; umbellets 10–12-flowered, involucre and involucels of 5 lanceolate membranous leaflets; petals broadly ovate, with acute inward curved tip, 0.5 mm long; fruit oblong-ovoid, yellow-olive, shiny, slightly furrowed but without distinct ribs; mericarps pentagonal in cross section; resinous canals many, narrow; seeds convex toward commissure. June–July.

Gentle herbaceous slopes, woody-shrubby mountain belt. — Centr. Asia: T. Sh. (Kirghiz, Tashkent, Talass Ala-Tau). Endemic. Described from W. Tien Shan. Type in Leningrad.

4. *M. oeroilanica* Korov. in Addenda XV, 431.

Perennial; glaucous, subglabrous plant, with ovoid tuberculate tuber; stem furrowed, to 80 cm high, branching from middle to produce panicle, branches thickened; leaves mostly in rosette, their petioles short, dilated, scabrous at margins; cauline leaves reduced, the upper without blade, blade of radical leaves oval-lanceolate, many times (3–4) pinnatisect into dense, linear, 2–3 mm long lobules. Umbels of 4–5 irregular 5–25 mm long rays; involucre of 3–5 oblong-lanceolate leaflets; umbellets few-flowered, their involucels of oblong-oval, membranous leaflets concealing umbellet; petals broadly ovate, with acute inward curved tip; fruit (unripe) oblong, cylindrical, furrowed, with prominent ribs, 2.5 mm long; resinous canals many. June–July.

Gypsiferous sands, mountain semidesert zone. — Centr. Asia: Mtn. Turkm. Endemic. Described from Badkhyz. Type in Tashkent.

Section 2. *GALAGANIA* (Lipsky) Korov. — *Galagania* Lipsky in Tr. Bot. Sada, XVIII (1900) 62, pro gen. — Fruit ovoid, leaves with broad sheath.

5. *M. fragrantissima* (Lipsky) K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 204. — *Galagania fragrantissima* Lipsky in Tr. Bot. Sada, XVIII (1900) 63. — *Bunium fragrantissimum* K.-Pol., l. c. — Exs.: G. R. F. No. 1872.

419 Perennial; entirely glabrous green plant, with spherical or ovoid tuber; stem to 1 m high, thin, with white striae, branching at middle to produce broad spreading panicle, branches thin, with short lateral branches; leaves thin, rapidly withering, with disagreeable odor, the radical petioled, with triangular blade, many times (3–4) pinnatisect into filiform, long, 1–2.5 cm long, 0.2–0.3 mm wide spreading lobules; cauline leaves similar, smaller, sessile on lanceolate coriaceous sheaths, with recurved margins; upper leaves reduced to small scales. Umbels of 4–6 compressed, unequal rays, the outer 2–3 times as long as the inner, to 25 mm long, glabrous; involucre of 5 lanceolate curved leaflets; umbellets 5–10-flowered, involucels similar to involucre; flowers on thin unequal pedicels; petals ovate, yellow, distinctly tapering at base; fruit obpyriform or nearly elliptic, with inconspicuous ribs; resinous canals 3 in each vallecule, 1 larger than the others, canals hardly visible in ripe fruit; stylopodium conical, $\frac{1}{3}$ – $\frac{1}{2}$ length of fruit, styles thickish, reflexed, shorter than stylopodium; albumen inflated toward commissure. June–July. (Plate XXX, Figure 14.)

Herbaceous mountain slopes in steppe belt. — Centr. Asia: T. Sh. (Kirghiz, Tashkent Ala-Tau), Pam.-Al. (Alai Range, Gissar Range), Syr D. (Mal'guzar Mountains). Endemic. Described from the foothills of Pamir-Alai and Tien Shan. Type in Leningrad.

Economic importance. The plants contain to 0.3% essential oil (Kudryashev) and are strongly aromatic, especially the fruits (hence their specific name). Distillation of fresh specimens yields 0.019–0.3% of a pale yellow essential oil with a sharp smell, suitable for practical uses.

Genus 1012.* **KORSHINSKYA** ** Lipsky

Lipsky in Tr. Bot. Sada, XVIII (1900) 60

Flowers bisexual, calyx with short inconspicuous teeth; petals greenish-yellow, curved inward, obtuse or slightly notched, dilated at apex; stylopodium flattened; styles short; fruit rounded, compressed laterally; mericarps with narrow commissure, smooth, without distinct ribs; resinous canals broad, appearing like narrow slits, 1 in each vallecule, 2 toward commissure; mesocarp thin, homogeneous, stereomes not highly developed; seeds slightly concave toward commissure. Perennial herbs with thickened root and dissected leaves, deciduous at flowering.

Two species, in the southern part of Central Asia. Some authors unite it with *Physospermum* (Drude, 1898, Kozo-Polyanskii, 1916), which differs in the color of the petals and shape of the seeds (orthospermous). All considered, it should be recognized as a distinct genus.

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1. Leaflets of involucre and involucels foliate, umbellets 15–20-flowered
..... 1. *K. olgae* (Rgl. et Schm.) Lipsky.
- + Leaflets of involucre and involucels narrowly lanceolate, umbellets
6–9-flowered 2. *K. bupleuroides* Korov.

1. *K. olgae* (Rgl. et Schmalh.) Lipsky in Tr. Bot. Sada, XVIII (1900) 60. — *Physospermum olgae* Rgl. et Schmalh. in Izv. Obshch. lyubit. est. antr. i etn. XVIII (1881) 40; Kozo-Pol. in Vestn. Tifl. Bot. sada, III, IV (1915) 153. — *Conopodium olgae* K.-Pol. in Byull. Mosk. Obshch. isp. prir. XXIX, nov. ser. (1915) 205. — Ic.: Lipsk. in Tr. Bot. Sada, XXIII (1904) tabl. VII, fig. 1–5.

Perennial; violet, entirely glabrous plant; root thickened, turnip-shaped, bearing several short laterals; stem 50–80 cm high, straight, thinly furrowed below, angular-faceted above, its neck covered with fibrous leaf remnants, branching from middle, branches alternate, the lower not reaching level of axial umbel; radical and lower cauline leaves with long flattened petioles, incompletely embracing stem, blade triangular-oval, bipinnatisect, its sections nearly pinnatifid into lanceolate obtuse entire or dentate ca. 10 mm long, 3 mm wide lobules; median leaves short-petioled, with simple blade; upper leaves sessile, reduced to lanceolate or oval-lanceolate, sometimes opposite leaflets. Umbels double, the axial large, containing to

* Treatment by E. P. Korovin.

** Named after academician S. I. Korzhinskii (1861–1900), a notable botanist.

12 rays with the lateral at tips and along branches, rays furrowed, unequal, to 14 cm long in axial umbels, involucre of 3–5 unequal foliate lanceolate to 3 mm long leaflets; umbellets 15–20 (rarely to 25) flowered; pedicels unequal, 5–12 mm long, involucels of 2–4 leaflets similar to involucral leaflets, half length of pedicels; calyx with short triangular teeth; petals broadly elliptic, apically dilated, 1.2 mm long; fruit nearly cylindrical, olive-colored, mericarps nearly circular in cross section, with slightly protruding filiform ribs. July–August. (Plate XV, Figure 9.)

Gentle herbaceous slopes in central mountain belt. – Centr. Asia: Pam.-Al. (Zeravshan, Gissar ranges, Darvaz, Karategin, Kugitang Mountains). Endemic. Described from Shakhimardan. Type in Leningrad.

2. *K. bupleuroides* Korov. in Not. Syst. ex Herb. H. Bot. Reip. Russ. V, 5 (1924) 83.

421 Perennial; pale green, entirely glabrous plant; root thickened, turnip-shaped, with few branches; stem 35–45 cm high, furrowed to apex, branching from middle or slightly above, branches alternate, the upper sometimes approximate; radical and lower cauline leaves with long scabrous petioles, their blade of lanceolate lobes, the upper reduced to short lanceolate sheaths. Umbels more or less equal, of 6–9 unequal, 1–3 cm long rays; involucre and involucels of short narrowly lanceolate leaflets; umbellets 6–9-flowered; calyx short-toothed; petals elliptic with broadly notched apex, 1 mm long; fruit (unripe) globose ovoid; mericarps rounded-angular, ribs inconspicuous. June–July.

Calcareous outcrops in central mountain belt. – Centr. Asia: T. Sh. (Mogol-Tau Mountains). Endemic. Described from Mogol-Tau (Popov and Vvedenskii, No. 275). Type in Tashkent.

Genus 1013. **CHAMAESCIADIUM** * C. A. M.

C. A. M. Verzeichn. Pfl. Cauc. (1831) 122 – Pimpinella § 22. Chamaesciadium O. Ktze. in Post et O. Ktze. Lex. gen. phan. (1903) 439

Calyx-teeth inconspicuous; petals yellowish, ovate-lanceolate, entire, with inward curved tip; fruit ovoid-oblong, compressed laterally; mericarps with 5 filiform ribs; canals 3–4 under valliculae, 3–6 toward commissure; stylopodium short-conical, undulate at margin; styles reflexed, longer than stylopodium; albumen subcircular in cross section, flat toward commissure. Perennial, nearly acaulescent herbs, with simple or compound umbels and bipinnate leaves.

A monotypic genus common to the high ranges of the Caucasus, Asia Minor, Turkish Armenia and Iran.

1. *C. acaule* (M. B.) Boiss. Fl. or. II (1872) 860; Shmal'g., Fl. I, 395; Grossg., Fl. Kavk. III, 159. – *Ch. flavescens* C. A. M. Verzeichn. Pfl. Cauc. (1831) 122; Ldb. Fl. Ross. II, 253. – *Bunium acaule* M. B. Fl. taur.-cauc. I (1808) 212; DC. Prodr. IV, 116. – *Ammi acaule* Spreng. Umbell. Prodr. (1813) 122 et in Schult. Syst. VI (1820) 530. – *Carum acaule* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 197.

* From the Greek *chamai* – on the ground, *scias* – umbrella.

422 Perennial; plant entirely glabrous; root vertical, thick (ca. 1 cm), multicapital; plant acaulescent or with short, 2–10 cm long stem, rarely stem to 20 cm high; all leaves radical, oblong, their petioles as long as blade, gradually dilated into sheath; blade 2–3 cm long, ca. 1 cm wide, bipinnatisect, lower primary lobes on petiolules, the upper sessile, terminal lobes linear, 2–4 mm long, ca. 0.5 mm wide, acute. Umbels of 11–13 ribbed glabrous rays; general peduncle mostly absent, umbellets on more or less long stipes borne on undeveloped stem, often spreading along ground; involucre of 5–7 linear entire acute or pinnatisect leaflets with scarious margin, with linear lobes; umbellets 15–21-flowered, with glabrous pedicels, hardly thickening in fruit; involucels of 7–10 linear acute entire or pinnatifid leaflets with scarious margin; petals white or yellowish, entire, 1.3 mm long; fruit ovoid, 3.5–4 mm long, ca. 2 mm wide; stylopodium flat; styles longer than stylopodium, reflexed. July. (Plate XXX, Figure 15.)

Pebbly slopes in alpine belt. — Caucasus: Cisc., Dag., E., W. and S. Transc. Gen. distr.: As. Min. (Pontus Range), Arm.-Kurd., Iran. Described from the Caucasus. Type in Leningrad.

Economic importance. In alpine meadows the plant is readily grazed by cattle. According to N. Troitskii it contains 12.83% ash, 14.14% protein, 3.52% oil, 28.76% cellulose, and 40.75% nitrogen-free extractive substances.

Note. Anisocarpy due to one of the mericarps not developing is frequent. Often one of the mericarps is reduced to a rudiment; as a consequence, a slit is formed between the mericarps at the apex of the fruit.

Genus 1014. **PIMPINELLA** * L.

L. Sp. pl. ed. 1 (1753) 263. — *Tragoselinum* Mill. Dict. ed. 4 (1754); Adans. Fam. II (1763) 95. — *Tragium* Spreng. Pl. Umbell. Prodr. (1813) 26. — *Ledeburia* Link, Enum. hort. Berol. I (1821) 286. — Carum Baill. Hist. pl. VII (1880) 719, ex p. — *Apium* sect. VI *Pimpinella* Calest. in Webbia, I (1905) 177

425 Flowers bisexual, calyx-teeth inconspicuous; petals all equal, glabrous or dorsally pubescent, notched, with small inward curved lobe, white, rarely pinkish or purple; involucre and involucels present or absent or the latter of 1 to few leaflets; fruit ovoid-globular or ovoid, more or less constricted along commissure, glabrous or bristly-hairy or densely pubescent, slightly compressed laterally; stylopodium pulviniform or conical; styles thin, divergent or recurved, usually long, ribs filiform, vallecule with 2–3 canals, endosperm dorsally more or less obtusely pentagonal or cylindrical, flat or slightly notched toward commissure. Perennial, sometimes woody at base, rarely biennial or annual herbs, pubescent or glabrous, with simple or bi-tripinnate leaves.

* The name was first used by Benedictum Crispum (7th century of the common era), later by Simon Januensem (13th century); origin unknown.



PLATE XXVII. 1 — *Pimpinella puberula* (DC.) Boiss.; 2 — *P. litophila* Schischk.; 3 — *Falcaria falcarioides* (Bornm. et Wolff) Wolff.

1. Ovary and fruit glabrous (subgenus *Tragoselinum* (Mill.) Schischk.) 2.
- + Ovary and fruit pubescent or short-scabrous (subgenus *Tragium* (Spreng.) Rchb.) 9.
2. Involucre and involucels present 8. *P. anthriscoides* Boiss.
- + Involucre and involucels absent or involucre 1-leaved 3.
3. All leaves radical, stem leafless, plant glabrous (S. Transcaucasia) 5. *P. nudicaulis* Trautv.
- + Stem more or less leafy, plant usually pubescent, rarely subglabrous. 4.
4. Radical and lower cauline leaves ternately bipinnate with narrow, 1–3 mm wide and 1–4 cm long terminal lobules (S. Transcaucasia) 7. *P. peucedanifolia* Fisch.
- + Radical leaves simple or bipinnate, if the latter then terminal lobules wider and shorter 5.
5. Stem hollow with acute ribs (W. European part of USSR) 6. *P. major* Huds.
- + Stem not hollow, cylindrical, thinly furrowed (without acute ribs) 6.
6. Median and upper cauline leaves differing little from the lower, lobes of lower leaves often bipinnatifid; outer petals ca. 1.5 mm, rarely 1 mm long; styles after flowering 1.5–2 mm long, longer than young fruit; ripe fruit 2.5–3.5 mm long, ribs distinct 7.
- + Stem covered above with sheaths lacking blades, median cauline leaves markedly differing from the lower, more cut and with narrower terminal lobules; outer petals ca. 1 mm long; styles not exceeding 1 mm after flowering, shorter than young fruit; ripe fruit not more than 2.5 mm long, with obscure ribs 1. *P. saxifraga* L.
7. Petals purple-pink or pink, very rarely white (Caucasus) 4. *P. rhodantha* Boiss.
- 426 + Petals white (European part of USSR, Transbaikalia and Far East) 8.
8. Stem covered with short retrorse hairs in lower half, petioles of radical leaves pubescent, fruit 3 mm long (Far East and Transbaikalia) 3. *P. thellungiana* Wolff.
- + Stem glabrous or slightly pubescent below, like radical leaves; fruit 2–2.5 mm long (W. European part of USSR) 2. *P. dissecta* Retz.
9. Annuals, with thin root (Centr. Asia) 21. *P. puberula* (DC.) Boiss.
- + Perennials or biennials 10.
10. Involucre and involucels absent 11.
- + Involucre and involucels present or only involucels present 22.
11. Stylopodium elongate-conical, gradually passing to styles; biennials 12.
- + Stylopodium flat-pulviniform; perennials 14.
12. Umbels of 5–10 rays (Caucasus) 18. *P. aromatica* M. B.
- + Umbels of 10–45 rays 13.
13. Fruit 2 mm long, styles erect-divergent; umbel compressed in fruit (Crimea) 19. *P. taurica* (Ldb.) Steud.
- + Fruit 1–1.5 mm long, styles reflexed, umbels not compressed in fruit (Caucasus and Centr. Asia) 20. *P. affinis* Ldb.

14. Leaves bi- or nearly tripinnatisect, usually with narrow (1–2(4) mm) terminal lobules 15.
 + Leaves simple pinnate, leaflets with varying margins, more or less deeply dentate 19.
 15. Umbel rays 5–9, leaves subglabrous or with spreading velutinous hairs (Caucasus) 16.
 + Umbel rays 10–20, leaves with dense and grayish pubescence (European part of USSR) 18.
 16. Petals glabrous outside 11. *P. daghestanica* Schischk.
 + Petals densely hairy outside 17.
 17. Leaves subglabrous 12. *P. idae* Takht.
 + Leaves with short velutinous hairs . . . 13. *P. grossheimii* Schischk.
 18. Leaves tripinnate, terminal lobules narrow, 0.5 mm wide 10. *P. tomiophylla* (Woron.) Stank.
 + Leaves bipinnatisect, lobules wider, 1–4 mm wide 9. *P. titanophila* Woron.
 427 19. Umbel rays 5–10(20) 20.
 + Umbel rays 10–25 21.
 20. Styles short after flowering (0.5–0.8 mm), fruit finely scabrous, subglabrous before ripening (Turkmenia) 17. *P. litvinovii* Schischk.
 + Styles 1.5–2 mm long after flowering; fruit densely hairy (Crimea) 16. *P. lithophila* Schischk.
 21. Umbel rays usually densely hairy; styles not exceeding 2 mm after flowering 15. *P. turcomanica* Schischk.
 + Umbel rays sparsely pubescent, sometimes subglabrous; styles 2.5–3 mm long at flowering 14. *P. confusa* Woron.
 22. Leaflets of involucre and involucels 3–7 23.
 + Involucre absent, involucels 3–5-leaved . . . 23. *P. armena* Schischk.
 23. Biennials, umbels of 10–20 rays, petals white 22. *P. ramosa* Schischk.
 + Perennials, umbels of 2–5 rays, petals greenish 24. *P. korshinskyi* Schischk.

Subgenus 1. *Tragoselinum* (Mill.) Schischk. — Genus *Tragoselinum* Mill. Dict. ed. 4 (1754). — Sect. *Tragoselinum* Drude in Engl. Pflanzenfam. III, 7–8 (1898) 196. — Fruit glabrous, perennial herbs.

Series 1. *Eu-Saxifragae* Wolff in Engl. Pflanzenr. IV, 228 (1927) 228. — Involucre and involucels absent.

1. *P. saxifraga* L. Sp. pl. (1753) 263, excl. var.; Ldb. Fl. Ross. II, 255; Boiss. Fl. or. II, 873; Shmal'g., Fl. I, 383; Kryl., Fl. Zap. Sib. VIII, 2075; Grossg., Fl. Kavk. III, 61. — *P. hircina* Mill. Gard. Dict. ed. VIII (1768) No. 3. — *P. latifolia* Gilib. Fl. lithuan. II (1782) 42–43. — *P. variifolia* Salisb. Prodr. (1796) 168. — *P. rosea* Lindem. in Bull. Soc. Nat. Mosc. (1850) IV, 488. — *P. major* Grossh. Fl. Kavk. III, 161, non Huds. — *Tragoselinum minus* Lam. Fl. franc. III (1778) 447; Rupr. Fl. ingr. 439. — *T. saxifragum* Moench Meth. (1794) 99. —

Carum saxifraga Baill. Hist. pl. VII (1880) 120. — *Selinum pimpinella* E.H.L. Krause in Sturm, Fl. Deutschl. 2 Aufl. XII (1904) 53. — *Apium tragoselinum* Crantz, Class. Umbellif. emend. (1767) 100. — *A. saxifragum* Calest. in Webbia, I (1905) 178. — Ic.: Rchb. Ic. fl. Germ. XXI, tab. 1859, f. IV. — Exs.: G.R.F. No. 1473, a, b, c, No. 1474; Fl. Finl. exs. No. 831 (var. *rotundifolia* Scop.); Fl. polon. exs. No. 636.

Perennial; root fusiform, branching, its neck covered with fibrous
 428 leaf remnants; stem 15–60 cm high, cylindrical, thinly ribbed, branching, with rosette of radical leaves leafy only in lower part, nearly leafless above, like leaves short-haired or subglabrous; leaves pinnate, the lower with petioles 10–20 cm long, their blade ovate or rounded-ovate (var. *rotundifolia* Scop.), obtuse, large-toothed, short-petiolate or 3–5 pairs of sessile leaflets; terminal leaflets often 3-lobed or 3-partite; median cauline leaves with cuneate leaflets more deeply cut into narrow lobes at base, nearly pinnate, sessile on sheaths; upper leaves with simple pinnate or 3-partite small blade with lanceolate or sublinear lobes; uppermost leaves with reduced blade. Umbels 5–8 cm across, of 6–21 thin glabrous rays; involucre and involucels absent; petals white, rarely pink, bristly-hairy outside, ca. 1 mm long; fruit glabrous, short-ovoid, 2–2.5 mm long, 1.5–2 mm wide. June–August.

Fallow fields, edges of forests, pine forests, exposed slopes, reaching the subalpine mountain belt. — European part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., Balt., U. Dnp., U. V., V.-Kama, M. Dnp., V.-Don, Transv., U. Dns., Bl., L. Don, L. V., Crim. (near Simferopol' and Dolgorukovskaya Yaila); Caucasus: Cisc., Dag., E., S. and W. Transc. (not found in Talysh?); W. Siberia: all regions; E. Siberia: Yenisei, Ang.-Say.; Centr. Asia: Ar.-Casp. (N.). Gen. distr.: Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from European dry meadows. Type in London.

Economic importance. Steam distillation of the root of *P. saxifraga* yielded 0.02–0.4% essential oil with a disagreeable smell.

2. *P. dissecta* Retz. Obs. III (1783) 30, tab. 2; Prytz. Fl. Fenn. brevior. (1819–1821) 90. — ? *P. laciniata* Gilib. Fl. lithuan. II (1782) 43. — *P. saxifraga* β . *major* b. *dissectifolia* Wallr. Sched. crit. (1822) 124. — *P. saxifraga* var. *dissectifolia* Koch, Synops. ed. 2 (1843–1845) 316; Ldb. Fl. Ross. II, 255; Shmal'g., Fl. I, 394. — Ic.: Retz. l. c. tab. II. — Exs.: G.R.F. No. 1474 (sub *P. saxifraga* var. *dissectifolia* Wallr.); Pl. Finl. exs. No. 852 [sub *P. saxifraga* β . *dissecta* (M.B.) Spreng.].

Perennial; stem 60–90 cm high, like leaves glabrous or very short-haired, branching nearly from base with obliquely ascending branches; radical leaves early withering, lower cauline leaves ovate or triangular-ovate, their petioles usually longer than blade, blade bipinnatisect, 10–12 cm long, 6–7 cm wide, with oblong-linear, 0.5–2 cm long, 1–2 mm wide, acute
 429 lobules; upper leaves smaller and less dissected, sessile on oblong sheath, the uppermost without blade. Umbels 2.5–4 cm across, of 13–17 glabrous rays; involucre and involucels absent; petals white, broadly ovate, ca. 1 mm long, notched, with inward curved lobe; fruit glabrous, ovoid, 2–2.5 mm long,

ca. 1.5 mm wide, hardly constricted at apex, ribs inconspicuous, stylopodium short-conical, styles divergent, long (1.5–2 mm), with capitate stigma. June–August.

Pine forests, mixed and oak forests on sandy soil, riparian and lacustrine sands, hilly slopes, fluvial plains, fallow sandy fields. – European part: Kar.-Lap., Lad.-Ilm., Balt., U.Dnp., U.Dns. Gen. distr.: Scand., Centr.Eur. Described from Europe. Type in Lund.

Note. This species has not yet been found west of the Leningrad, Pskov, Velikolutsкая and the Smolensk regions. Although *P. laciniata* has priority it cannot be accepted as it is impossible to decide whether it refers to *P. saxifraga* L. s. l. or *P. major* (L.) Huds.

3. *P. thellungiana* Wolff in Engl. Pflanzenr. IV, 228 (1929) 304. – *P. dahurica* Turcz. ex Bess. in Flora, XVII (1834) I Beibl. p.13, nom. nud. – *P. saxifraga* Ldb. Fl. Ross. II, 255, quoad plantam dahuricam. – *P. magna* β . *dissecta* Turcz. Fl. baic.-dah. I (1842–1845) 473, non DC.; Kom., Fl. Man'chzh. II, 144; Kom. and Klob.-Alis., Opred. rast. Dal'nevost. kr. II, 803.

Perennial; stems 20–80 cm high, usually few, straight, cylindrical, thinly furrowed, covered with short retrorse hairs in lower half, slightly branching above; radical leaves 15–25 cm long, their petioles long pubescent, as long as or twice as long as blade, blade ovate-oblong, pinnate, with 3–5 pairs of primary leaflets; leaflets sparsely hairy above, more densely covered with curly hairs beneath, with ciliate margins, oblong or subrounded, cuneately tapering to base, ca. 2–3.5 cm long, 1.5–2.5 cm wide, ovate-lanceolate, large-toothed or lobed or pinnatifid; cauline leaves similar, with larger leaflets; uppermost leaves with reduced blade, sessile on sheaths. Umbels 2.5–6 cm across, of 12–15 filiform glabrous nearly equal rays; involucre and involucels absent; umbellets 15–20-flowered; pedicels filiform, glabrous; petals glabrous, obcordate, ca. 1 mm long, with narrow acute inward curved tip; fruit narrowly ovoid, ca. 3 mm long; stylopodium short-conical, abruptly passing into thin
430 straight slightly divergent styles; ribs filiform, valleculeae with 3 canals, 4–6 canals toward commissure. July.

Meadows (sometimes solonchik), abandoned fields, sand dunes. – E. Siberia: Dau.; Far East: Ze.-Bu., Uss. Gen. distr.: Jap.-Ch. (China, Manchuria?). Described from the Far East. Type in Berlin.

4. *P. rhodantha* Boiss. in Tchihatcheff, Asie Min. Bot. I (1860) 414; Boiss. Fl. or. II, 874; Shmal'g., Fl. I, 393; Grossg., Fl. Kavk. III, 160. – *P. dissecta* M. B. Fl. taur.-cauc. I (1808) 241, non Retz. (1783). – *P. magna* δ . *rosea* Stev. ex DC. Prodr. IV (1830) 120; Ldb. Fl. Ross. II, 254. – *P. magna* Hohen. Enum. Elisabethpol. (1833) 223. – *P. magna dissecta* Eichw. Plant. nov. vel minus cogn. in itinere casp.-cauc. (1831–1833) 31. – Exs.: G. R. F. No. 1767; Herb. Fl. cauc. No. 436; Pl. orient. exs. No. 191.

Perennial; rhizome short, ascending; stem 20–100 cm high, thinly pubescent, ribbed, branching in lower half; radical leaves with more or less long petioles abruptly passing into oblong, dilated whitish or violet

sheath, with petioles 10–20 cm long, 3–5 cm wide, simple pinnate, lobes broadly ovate or oblong, acute or obtuse, largely incised-dentate, sometimes nearly lobed; lower leaves on short petioles, the upper sessile 1.5–2.4 cm long, 1–2 cm wide; upper leaves sessile on sheath, smaller and less cut, nearly bipinnate, with oblong-linear lobules. Umbels 2.5–5 cm across, of 10–20 smooth nearly equal rays; involucre and involucels absent; pedicels more or less hairy; petals pink-purple, rarely white (var. *albiflora* Bordz.); fruit glabrous, ovoid, 2.5 mm long, 1.2 mm wide; stylopodium nearly cylindrical. July.

Subalpine meadows. — Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: Arm.-Kurd., As. Min., Iran. Described from mountains near Gyumyushkhan. Type in Geneva.

5. *P. nudicaulis* Trautv. in Tr. Bot. Sada, II (1873) 473; Boiss. Fl. or. Suppl. (1884) 254; Grossg., Fl. Kavk. III, 160. — *P. squamosa* Karjag. in Tr. Bot. Inst. Baku, II (1936) 265.

Perennial; root thick, producing reduced apical shoots, densely covered with dead petioles; stems few, 30–70 cm high, straight or ascending at base, glabrous, branching above; radical leaves numerous with long petioles, linear-oblong, with petioles 7–11 cm long, ca. 2 cm wide, pinnate, with 2–3 pairs of sessile primary leaflets, the distal broadly ovate, large-toothed or pinnatisect into lanceolate-linear lobules, glabrous or very rarely slightly scabrous-hairy; cauline leaves few, sometimes absent, small, with linear lobules. Umbels of 5–9 irregular smooth rays; involucre and involucels absent; petals white, very small, ca. 0.5 mm long, hardly notched; fruit ovoid, 2.5 mm long, ca. 1 mm wide, smooth; stylopodium short-conical, styles slightly longer than stylopodium, reflexed. June.

Stony, often limestone slopes. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. Described from Kazikoparan Mountains (formerly Surmalinskii district). Type in Leningrad.

6. *P. major* (L.) Huds. Fl. Angl. ed. 1 (1762) 110; Mill. Gard. Dict. ed. VIII (1768) No. 1; Wolff in Engl. Pflanzenr. IV, 228 (1927) 289. — *P. saxifraga* γ. *major* L. Sp. pl. (1753) 264. — *P. magna* L. Mant. II (1771) 217; Ldb. Fl. Ross. II, 254; Shmal'g., Fl. I, 393. — *P. austriaca* Mill. Gard. Dict. ed. VIII (1768) No. 5. — *P. orientalis* Gouan Illustr. (1773) 21. — *P. media* Weber in Wigg. Prim. Fl. Holsat. (1782) 26. — *P. angustifolia* Gilib. Fl. lithuan. II (1782) 42. — *P. rubra* Hoppe et Schleich. ex Spreng. in Schult. Syst. Veg. VI (1820) 384. — *P. tenuifolia* Schwaegr. et Koerte ex Steud. Nomencl. ed. II, 2 (1841) 335. — *P. rugosa* Kunze in Flora, XXIX (1846) 654. — *Tragoselinum majus* Lam. Fl. Franc. III (1778) 448. — *T. magnum* Moench, Meth. (1794) 99. — *Carum magnum* Baill. Hist. Pl. VII (1880) 178. — *Apium pimpinella* Car. in Parl. Fl. ital. VIII (1889) 452. — Ic.: Rchb. fil. XVII, tab. 27. — Exs.: G. R. F. No. 2634; Pl. Finl. exs. No. 830; E. Woloszczak, Fl. polon. exs. No. 728.

Perennial; root fusiform, branching; stem 40–100 cm high, straight, hollow, deeply furrowed, glabrous, with clusters of leaves at base; lower leaves petioled, simple-pinnate, with 2–4 pairs of ovate or oblong, 2.5–7 cm long, 1–4 cm wide, cuneate acute or acuminate, rounded or slightly cordate,

unequally acute- or incised-dentate leaflets with scabrous margins, lower leaves petioled, the upper sessile, terminal leaflets 3-lobed or 3-partite, median and upper cauline leaves sessile on dilated sheath with white scarious margin, leaflets narrower, more deeply dissected; uppermost leaves small, trifid or obsolete. Umbels of 9–15 thin glabrous rays; involucre and involucels usually absent; petals white or pink, the outer ca. 1.4 mm long; fruit oblong-ovoid, 2.5–3.5 mm long, 1.5–2 mm wide, dorsal ribs protruding, canals 4 under valliculae, 4 toward commissure, styles 1.5–2 mm long. July–August.

- 432 Shrubby formations, forest edges, in forests; to 62–63°N – European part: Kar.-Lap., Lad.-Ilm., Balt., U. Dnp., M. Dnp., U. Dns., Bes. Gen. distr.: Scand., Centr. and Atl. Eur., Med., Bal.-As. Min. (N. Balkans). Described from England. Type in London.

Series 2. *Peucedanifoliae* Wolff in Engl. Pflanzenr. IV, 228 (1927) 289. – Lower leaves ternately pinnate, with elongate terminal lobules.

7. *P. peucedanifolia* Fisch. in Ldb. Fl. Ross. II (1844) 256; Grossg., Fl. Kavk. III, 161. – *P. quercetorum* Woron., Tr. Bot. inst. im. Komarova AN SSSR, ser. I, 1 (1933) 219. – *Carum peucedanifolium* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXIX (1915) 198.

Perennial; plant thinly scabrous-hairy in lower half, subglabrous above; root neck densely covered with brown fibrous remnants of petioles; stems thin, branching, 35–90 cm high; radical leaves long-petioled, ovate-oblong, twice ternate-pinnate, into narrowly linear (var. *quercetorum* (Wor.) Schischk.), linear-oblong or lanceolate, 1–4 cm long, 0.5–3 mm wide, acute, lobules, flat or with rolled margins, entire or with 3 distal teeth; cauline leaves smaller, less dissected, the uppermost reduced to a few colored, gradually acuminate sheaths. Umbels 2.5–4 cm across, of 5–8(17) thin glabrous or hairy, unequal cylindrical rays; involucre absent or 1-leaved; umbellets 1.5–2 cm across; 9–12-flowered; involucels absent; petals white or slightly pink, glabrous; fruit ovoid, smooth, with 3 protruding dorsal ribs, 3–4 mm long, 1.5 mm wide. July–August.

Mountain oak forests, exposed slopes and rocks to 2,400 m. – Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. (Kars region). Described from Karabakh. Type in Leningrad.

Series 3. *Anthriscoidae* Wolff in Engl. Pflanzenr. IV, 228 (1927) 289. – Involucre and involucels present.

8. *P. anthriscoides* Boiss. Fl. or. II (1872) 874; Wolff in Engl. Pflanzenr. IV, 228 (1927) 306. –? *P. cruciata* var. *somkhetica* Bordz. in Fedde, Repert. spec. nov. XXX (1932) 378. – *P. cervariaefolia* Grossh., Fl. Kavk. III, 161, non Freyn et Sint.

- 435 Perennial; rhizome horizontal, ca. 1 cm thick, producing numerous thin roots; stem single, 40–120 cm high, 5–17 mm thick, glabrous, angular-ribbed, branching above; radical leaves long-petioled, 3-partite, bipinnatisect, secondary lobes ovate-oblong, 2.5–4 cm long, 1.5–2.5 cm wide, the



PLATE XXVIII. 1 — *Pimpinella aromatica* M.B.; 2 — *Szovitsia callicarpa* Fisch. et Mey.

lower lobes on petiolules, the median sessile, the upper decurrent, unequally dentate, the teeth with short white mucro, paler, nerves scabrous beneath; upper leaves smaller, sessile, lanceolate, pinnatifid. Umbels of 8–15 nearly equal, glabrous rays, involucre of 3–7 persistent linear thinly acuminate recurved or spreading leaflets. Umbellets ca. 1 cm across; involucels of 3–5 linear thinly acuminate leaflets as long as umbellet or much shorter than umbellet, with more or less scarious margin; petals white, 1.5 mm long, notched, with inward curved tip; fruit smooth, ovoid-oblong, 4 mm long, ca. 2 mm wide, with filiform ribs; valleculeae with 3–4 canals, 4–6 toward commissure; stylopodium short-conical; styles recurved, three times as long as stylopodium. June–July.

Forests, 1,500–1,800 m. — Caucasus: S. Transc. (Karaklis, Megrinskii region), Tal. (Orant). **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from Asia Minor. Type in Geneva.

Note 1. We were unfortunately unable to see the specimens collected in Karaklis by E. Bordzilovskii, but judging by his description these plants belong to *P. anthriscoides* Boiss., not to *P. cruciata* Bornm. et Wolff. (= *P. cervariifolia* Freyn et Sint.).

Note 2. We could not determine the plant from Turkmenia, which O. Kuntze called *P. anthriscoides* var. *dissecta* O. Ktze. (Tr. Bot. Sada, X (1887) 1921). According to Wolf the type specimen described by O. Kuntze, which he (Wolf) had seen, did not belong to *P. anthriscoides* (Engl. Pflanzenr. IV, 228 (1927) 306). Without the ripe fruits it is impossible to determine Kuntze's specimen precisely.

Subgenus 2. *Tragium* (Spreng.) Rchb. Consp. (1828) 143. — Genus *Tragium* Spreng. Pl. Umbell. Prodr. (1813) 26. — Fruit bristly-scabrous or sparsely hairy.

Section 1. *EUTRAGIUM* (Wolff) Schischk. in Addenda XV, 433. — Subsect. *Eutragium* Wolff in Pflanzenr. IV, 228 (1927) 26. — Perennials, sometimes with woody lower part, stylopodium pulviniform.

Series. 1. *Titanophilae* Schischk. — Leaves bi- or nearly tripinnate, umbel of 10–20 rays.

- 436 9. *P. titanophila* Woron. in Flora Yugo-Vostoka Evrop. ch. SSSR, V (1931) 792. — *P. tragium* β . *laciniata* DC. Prodr. IV (1830) 121, exp.; Ldb. Fl. Ross. II, 256, partim; Wolff in Engl. Pflanzenr. IV, 228 (1927) 252. — *P. Tragium* Shmal'g., Fl. I, 394, non Vill. — Exs.: G. R. F. No. 168 (sub *P. Tragium*).

Perennial; rhizome woody, obliquely ascending, branching; stems 15–40 cm high, few, rarely single, their base covered with dark brown remnants of petioles; entire plant with appressed grayish hairs, very rarely subglabrous (var. *glabrata* Schischk.); radical leaves many, oblong or ovate, with petioles 4–14 cm long, 1–3 cm wide, bipinnatisect, primary lobes ovate, pinnatifid or pinnatipartite into lanceolate acute

3–8 mm long, 1–4 mm wide decurrent lobules; cauline leaves few, smaller, the uppermost reduced to sheaths. Umbels 2–4 cm across, of 10–20 short-haired (very rarely subglabrous) nearly equal rays; involucre and involucels absent or involucre of 1–3 linear leaflets; umbellets 0.8 cm across; pedicels pubescent; petals white, ca. 1 mm long, pubescent outside; fruit ovoid, 3.5–4 mm long, shortly and densely pubescent, styles recurved after flowering, 1.5–2 mm long. June–July.

Chalk and limestone slopes. — European part: V.-Kama, V.-Don, L. Don, Transv., Bl. Endemic. Described from limestones in the European part of the USSR. Type in Leningrad.

10. *P. tomiophylla* (Woron.) Stank. in Taliev i Stank. Opređ. rast. (1949) 531, nom.; Shishkin in Mat. Gerb. Bot. inst. im. V. L. Komarova AN SSSR, XII (1950) 209. — *P. titanophila* var. *tomiophylla* Woron. in Flora Yugo-Vostoka Evrop. ch. SSSR, V (1931) 793. — Ic.: Voron, l. c. 520.

Perennial; rhizome thick, woody, branching, multicapital, densely covered with dark brown remnants of petioles; stems straight, 15–25 cm high, branching; entire plant covered with short grayish hairs; radical leaves many, their petioles as long as blade or shorter, ovate, bi- or tripinnatisect into linear acute terminal lobules, 3–7 mm long and ca. 1.5 mm wide; cauline leaves few, smaller and less dissected; blade of terminal leaves reduced or absent. Umbels 2–2.5 cm across, of 10 unequal densely pubescent rays; involucre and involucels absent; petals whitish, ca. 1 mm long, dorsally densely hairy; ripe fruit unknown. July.

Limestone slopes. — European part: Transv. Endemic. Described from Tura-Tau (near Sterlitamak). Type in Leningrad.

137 Series 2. *Caucasicae* Schischk. — Leaves bi- or nearly tripinnate, umbel rays 5–9.

11. *P. daghestanica* Schischk. in Bot. mat. Gerb. Bot. Inst. im. V. L. Komarova AN SSSR, XII (1950) 203.

Perennial; root thick, multicapital, its neck covered with brown fibrous remnants of petioles; stems few, 20–45 cm high, straight, branching, glabrous or very short-haired at base; radical leaves many, their petioles as long as blade, ovate or broadly ovate, glabrous or slightly hairy, bi- or nearly tripinnatisect, primary lobes sessile or short-petioluled, ovate, pinnatifid into 0.5–3 mm wide lanceolate lobules, cauline leaves smaller, less dissected; terminal leaves with reduced blade or blade absent. Umbels 1.5–3.5 cm across, of 4–6 (very rarely 9) unequal glabrous or very short-haired rays; involucre and involucels absent; petals white, ca. 1 mm long, dorsally glabrous; fruit ovoid, 2 mm long, 1 mm wide, densely pubescent; styles ca. 1 mm long, divergent at first, becoming recurved. June–July.

Pebbly slopes and rock crevices. — Caucasus: Dag. Endemic. Described from near Makhachkala. Type in Leningrad.

12. *P. Idae* Takht. in Not. system. ac geograph. Instituti bot. Tphilisiensis, 9 (1940) 24.

Perennial; root rather thick; stems few, 15–40 cm high, ascending at base, short-haired, subglabrous in upper half, branching nearly from base with obliquely ascending branches; radical leaves many, ovate, their petiole nearly as long as coriaceous, 6–7 cm long, 3–4 cm wide, bi- or nearly tripinnatisect blade; primary lobes 4–5 pairs, ovate, the lower pinnatisect, remote from the others; secondary lobes pinnate, with cuneate or deeply dentate lobules, with short sparse hairs, sometimes subglabrous; cauline leaves with reduced blade, sessile on densely hairy sheath or reduced to oblong-linear sheath. Umbels 1.5–4 cm across, of 6–9 unequal rays covered with very short sparse hairs or subglabrous; involucre and involucels absent; umbellets 5–8 cm across, rays with dense short hairs; petals white, ca. 1 mm long, dorsally pubescent; ovary densely hairy; ripe fruits unknown. July–August.

Rock crevices. — Caucasus: W. Transc. (Abkhazia). Endemic. Described from ravine of Bzyb' River. Type in Yerevan, cotype in Leningrad.

438 13. *P. grossheimii* Schischk. in Bot. mat. Gerb. Bot. Inst. im. V. L. Komarova AN SSSR, XII (1950) 204.

Perennial; root ca. 1 cm thick, erect or ascending, sometimes multicapital, its neck densely covered with brown fibrous remnants of petioles; stems 20–55 cm high, few, rarely single, straight, branching nearly from base, sometimes from middle, with obliquely antrorse branches, covered with short velutinous hairs in lower half, glabrous above; radical leaves many, their petioles shorter than blade or much longer, with sparse short velutinous hairs, their blade oblong or ovate, bi-tripinnatisect, 2.5–6 cm long, 1–3 cm wide, primary lobes ovate, the lower on more or less long petiolules (rarely sessile), the upper sessile, pinnatisect into lanceolate or ovate acute 2–10 mm long, 1–2 mm wide lobules; cauline leaves few, with small blade dissected into linear lobules, uppermost leaves adjacent to stem of sheath, with nearly obsolete blade. Umbels 2–4.5 cm across, of 4–7 smooth unequal rays; involucre and involucels absent; petals white, ca. 1 mm long, dorsally pubescent; fruit ovoid, 2.5 mm long, 1.5 mm wide; stylopodium short-conical; styles reflexed, 2–3 times as long as stylopodium. July.

Rocks, stony slopes, mountain steppes, 1,500–2,500 m. — Caucasus: Tal. Endemic. Described from between Ashurat and Dygya. Type in Leningrad.

Series 3. *Confusae* Schischk. — Leaves simple-pinnate, umbels of 6–20 rays.

14. *P. confusa* Woron. in Tr. Bot. Inst. Ak. Nauk SSSR, ser. 1, I (1933) 219; Grossg., Opr. rast. Kavk. (1949) 228. — *P. caucasica* Schischk. in Grossg., Ibid.

Perennial; rhizome thick, branching, multicapital; stems 15–45 cm high, straight, their base densely covered with remnants of petioles, slightly leafy, branching like leaves covered with short curly hairs; radical leaves

many, oblong, their petioles nearly as long as blade or longer, the blade simple-pinnate, the lower lobes on short petiolules, the upper sessile, unequally large-toothed at base or incised. Umbels 2–3.5 cm across, of (7)10–20 slightly hairy, sometimes subglabrous rays; involucre and involucels absent; petals white or pink, ca. 1 mm long; fruit ovoid-oblong, 2–2.5 mm long, 1.2 mm wide; stylopodium short-conical; styles 2.5–3 mm long at end of flowering. June–July.

Stony-pebbly slopes. — Caucasus: E., S. and W. Transc. (Novorossiisk region). **Gen. distr.:** Arm.-Kurd., As. Min. Described from Daralagez. Type in Leningrad.

15. *P. turcomanica* Schischk. in Bot. mat. Gerb. Bot. Inst. im. V. L. Komarova AN SSSR, XII (1950) 207. — *P. tragium* auct. fl. turcoman.

Perennial; rhizome obliquely ascending, branching; stems few, 20–50 cm high, their base covered with dark brown remnants of petioles, branching from middle or nearly from base; entire plant covered with appressed grayish hairs; radical leaves oblong, with petioles 8–12 cm long, 1.5–2.5 cm wide, simple-pinnate, with 2–6 pairs of sessile, broadly ovate, unequally toothed, leaflets; cauline leaves few, similar to the radical but smaller, upper leaves reduced to sheaths. Umbels 2–3 cm across, of 6–9 unequal, densely pubescent rays; involucre and involucels absent; petals white, ca. 1 mm long, hairy outside, notched; fruit densely hairy, broadly ovoid, 1.5–2 mm long, 1–1.5 mm wide; stylopodium pulviniform, styles ca. 1.5 mm long. May–June.

Clayey-stony slopes, 1,000–1,500 m. — Centr. Asia: Mtn. Turkm. Described from Iolder ravine. Type in Leningrad.

16. *P. lithophila* Schischk. in Bot. mat. Gerb. Bot. Inst. im. V. L. Komarova AN SSSR, XII (1950) 206. — *P. tragium* γ. *laciniata* DC. Prodr. IV (1830) 121, non *P. laciniata* Gilib. (1782), nec Spreng. in Schult. Syst. VI (1820) 392, in nota.

Perennial; root ascending, its neck densely covered with remnants of petioles; stems few, 15–40 cm high, erect, simple or branching above, rarely from base, with dense short hairs; radical leaves oblong, their petioles nearly as long as or longer than blade; blade 3–6 cm long, 1–2 cm wide; leaves numerous, simple-pinnate, with 3–5 pairs of sessile, pinna-tifid or deeply dentate leaflets, short-haired or subglabrous; cauline leaves smaller, sessile on dilated sheath. Umbels 1.5–2 cm across at flowering, of 5–10 unequal short-haired rays; involucre and involucels absent; umbellets 0.5–0.7 mm across, 10–16-flowered; petals white, ca. 1 mm long, dorsally pubescent, notched, with inward curved tip; fruit 440 ovoid, densely short-haired, 1.5 mm long, ca. 1 mm wide; stylopodium short-conical; styles 1–1.5 mm long after flowering, becoming recurved. July–August. (Plate XXVII, Figure 2.)

Stony slopes and rock crevices. — European part: Crim. Endemic. Described from the slopes of Agarmysh Mountain in Old Crimea. Type in Leningrad.

17. *P. litvinovii* Schischk. in Bot. mat. Gerb. Bot. Inst. im. V. L. Komarova AN SSSR, XII (1950) 208.

Perennial; root thick, its neck covered with dark brown remnants of petioles; stems few, 35–65 cm high, straight, branching from middle or nearly from base, lower part, like leaves, covered with short scabrous hairs, glabrous above; radical leaves many, simple-pinnate, oblong, their petioles as long as or longer than blade, 10–15 cm long, 1–2 cm wide, with 3–5 pairs of broadly ovate or subrounded leaflets, 0.8–1.5 cm long, nearly as wide, deeply and unequally dentate; cauline leaves smaller, few, the upper with blade reduced to oblong sheath with few sessile linear lobes. Umbels ca. 1.5 cm across at flowering, of 4–6 subglabrous rays; involucre and involucels absent; umbellets 6–8-flowered; petals white, dorsally glabrous, hardly notched; fruit ovoid, 2 mm long, 1.2 mm wide, finely scabrous, becoming subglabrous; stylopodium pulviniform; styles ca. 0.8 mm long after flowering. July.

Centr. Asia: Mtn. Turkm. Endemic. Described from Hajabad. Type in Leningrad.

Section 2. *TRAGIELLA* Schischk. in Addenda XV, 433. — Biennials, stylopodium conical.

18. *P. aromatica* M. B. Fl. taur.-cauc. I (1808) 241; Ldb. Fl. Ross. II, 257; Boiss. Fl. or. II, 868; Grossg., Fl. Kavk. III, 162. — *Tragium aromaticum* Spreng. Pl. Umbell. Prodr. (1813) 260 et in Schult. Syst. VI (1820) 393. — *Carum aromaticum* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXIX (1915) 197, non Salisb. (1796). — Exs.: G. R. F. No. 2633.

Biennial; entire plant densely covered with short hairs; root vertical or ascending, ca. 5 mm thick; stem single, 20–70 cm high, branching from middle with obliquely antrorse branches; radical and lower cauline leaves pinnate, on oblong petioles, 15–30 cm long, 1.5–4 cm wide, with 3–7 pairs of petioluled leaflets, broadly obcuneate, unequally and acutely toothed or 441 pinnatifid leaflets, 0.8–2 cm long, in upper part 0.5–1.5 cm wide; upper leaves sessile, smaller, with linear lobes; involucre and involucels absent. Umbels 2–4 cm across, of 5–10 nearly equal densely hairy rays; petals white, dorsally densely pubescent, notched, with inward curved tip; fruit densely hairy, broadly ovoid, 2.5 mm long, 2 mm wide; stylopodium conical; styles erect, divergent, much longer than stylopodium. July. (Plate XXVIII, Figure 1.)

Dry clayey and stony slopes, among shrubs. — Caucasus: Dag., E. Transc. Endemic. Described from Kurt-Bulak. Type in Leningrad.

19. *P. taurica* (Ldb.) Steud. Nomencl. ed. 2, II (1841) 336. — *Tragium tauricum* Ldb. Ind. sem. hort. Dorpat. (1819) et Link, Enum. pl. hort. Berol. I (1821) 286. — *Ledeburia pimpinelloides* Link, l. c. (1821).

Biennial; root cylindrical, ca. 0.5 cm thick; stem single, 20–90 cm high, usually straight, branching, covered below, like leaves, with short stiff retrorse hairs, glabrous above, thinly ribbed, cylindrical, hollow, branching from middle with obliquely antrorse branches, rarely simple;

lower leaves oblong, 10–17 cm long, 2.5–5 cm wide, simple or nearly bipinnate, the short petioles gradually passing to sheath embracing stem; primary lobes sessile, rounded or broadly ovate, 1.5–4 cm long, 1–2.5 cm wide, dentate or pinnatifid; upper leaves smaller, cut into linear, sometimes filiform glabrous or slightly hairy lobes. Umbels of 10–25 thin unequal scabrous-hairy rays, compressed in fruit; involucre absent; umbellets ca. 1 cm across, involucels absent; pedicels stiff-haired; petals white, notched, with inward curved tip; ovary and fruit densely covered with spreading stiff hairs; fruit ovoid, ca. 2 mm long; stylopodium conical, passing gradually to divergent (but not recurved) styles. June–July.

Stony and dry slopes, along railroad tracks and irrigation ditches, among cereal crops, pine forests, vineyards, gardens. — European part: Crim. (mainly on the Southern shore). Endemic. Described from the Crimea. Type in Leningrad.

Note. Very close to *P. peregrina*, from which it differs by the stem being smooth in upper half.

20. *P. affinis* Ldb. Fl. Ross. II (1844) 257; Boiss. Fl. or. II, 868; Wolff in Engl. Pflanzenr. IV, 228 (1927) 242. — *P. peregrina* auct. Fl. cauc. et Asiae Mediae, ex p. — *P. ambigua* C. Koch ex Wolff in Fedde, Repert. XVII (1921) 44; Wolff, l. c. 243. — Exs.: H. F. A. M. No. 34; *P. Sintenis*, It. transcasp.-pers. 1900–1901, No. 1741.

Biennial; root vertical or ascending, 3–4 mm thick; stem straight, 25–60 cm high, branching, densely covered with short spreading hairs, rarely stem completely glabrous (var. *glabra* Schischk.); radical leaves oblong, with petiole 10–15 cm long, 3–4 mm wide, simple-pinnate, with broadly ovate or subrounded sessile, unequally toothed, 1.5–3 cm long, 1–3 cm wide lobes, covered with short spreading hairs; upper leaves smaller, simple- or bipinnate, with lanceolate or sublinear lobes. Umbels 3–5 cm across, of 10–45 unequal rays covered with short spreading hairs; involucre absent; umbellets ca. 8 mm across; involucels absent; pedicels hairy; petals white, notched, with inward curved tip, hairy outside; fruit ovoid, hairy, ca. 1 mm long; stylopodium conical; styles recurved, $1\frac{1}{2}$ to 2 times as long as stylopodium. June.

Dry meadows, slopes, near dwellings, in orchards, cereal crops. — Caucasus: Cisc. (rarely), Dag., E. and W. Transc. (very rarely), Tal. — Centr. Asia: Syr D., Pam.-Al., T. Sh. (W.), Mtn. Turkm. Gen. distr.: As. Min., Iran. Described from Transcaucasia. Type in Leningrad.

Section 3. ANISOIDES Schischk. in Addenda XV, 433. — Annuals, with short fine hairs.

21. *P. puberula* (DC) Boiss. in Ann. sc. nat. 3 sér. I (1844) 129; Boiss. Fl. or. II, 866; Wolff in Engl. Pflanzenr. IV, 228 (1927) 235. — *Ptychotis puberula* DC. Prodr. IV (1830) 109. — Exs.: H. F. A. M. No. 35; *P. Sintenis*, It. transcasp.-pers. 1900–1901, No. 499, 397.

Annual; entire plant short-haired; root thin, vertical; stem 15–50 cm high, furrowed, furcately branching nearly from base or only above; radical leaves petioled, entire or 3-partite, early withering; leaflets rounded, cordate or truncate at base, unequally obtusely toothed, 1.5–3.5 cm long, 1.5–4 cm wide, terminal leaflet larger; median cauline leaves simple or nearly bipinnate, primary lobes petioluled, cuneate at base, dentate or cut into lanceolate or linear lobules. Umbels 2–4 cm across, of 7–11 rays covered with short spreading hairs; involucre and involucels absent; umbellets many-flowered, ca. 1 cm across; pedicels hairy, with obliquely antrorse
443 hairs; petals white, hairy outside, entire, rounded at apex; ovary and fruit hairy; stylopodium conical-flattened; styles divergent, sometimes many times longer than stylopodium, recurved. June–July. (Plate XXVII, Figure 1.)

Valleys of rivers and streams, feathergrass thickets, depressions, solonchic meadows, field edges, thinned out pistachio woodland. – Centr. Asia: T. Sh. (W.), Syr D., Pam.–Al., Mtn. Turkm. Gen. distr.: As. Min., Iran. Described from vicinity of Baghdad. Type in Geneva.

Note. This species is very close to *P. eriocarpa* Russ. and is in Central Asia sometimes classified as such, but it differs very clearly by the softer, nearly velutinous pubescence and the very short, flattened stylopodium. The stylopodium in *P. eriocarpa* is conical and gradually passes into the erect style. *P. eriocarpa* extends in a more southerly direction (Syria, Palestine, Iraq, S. Iran) and does not extend as far north.

22. *P. ramosa* Schischk. nom. nov. – *P. ramosissima* Schischk. in Bot. mat. Gerb. Bot. Inst. AN SSSR, XII (1950) 202, non Fisch. (1819). – *P. corymbosa* Boiss. Fl. or. II (1872) 869, ex p.; Grossg., Fl. Kavk. III. 163.

Perennial; entire plant covered with short scabrous hairs, very rarely subglabrous above; root 1–2 cm thick, its neck densely covered with fibrous brown remnants of petioles; stems few or single, 0.4–1 cm thick, 30–40 cm high, hollow, profusely branching from base or nearly from middle, branches obliquely antrorse, alternate, opposite or whorled; radical leaves early withering, numerous, oblong, 7–10 cm long, 1.3 cm wide, the petioles longer than blade, the blade bipinnatisect, with lanceolate-cuneate or sublinear lobes, 1–1.5 cm long, 1–5 cm wide, acute; cauline leaves many, smaller and less dissected, sessile on expanded sheath. Umbels 3–6 cm across, of 10–20 scabrous-hairy unequal rays; involucre of 5–7 linear acuminate stiff-haired leaflets with ciliate margin, half the length of the umbel rays; umbellets 0.5–0.8 cm across; involucels of 5–7 linear-lanceolate acuminate ciliate leaflets nearly as long as or slightly shorter than umbellets; petals white, dorsally

scabrous or subglabrous; ovary densely covered with short scabrous hairs; ripe fruit not known. June—July.

144 Stony slopes. — This species does not grow in the USSR, but occurs close to the southern borders of Transcaucasia. Gen. distr.: Arm.-Kurd. Described from Malazgirt. Type in Leningrad.

23. *P. armena* Schischk. in Bot. mat. Gerb. Bot. Inst. AN SSSR, XII (1950) 210.

Perennial; entire plant covered with short scabrous hairs; root ascending, ca. 4 mm thick, its neck covered with dark brown fibrous leaf remnants; stem ca. 30 cm high, straight, angular-ribbed, branching nearly from base with obliquely antrorse branches terminated by umbel, together forming a corymbiform panicle, densely covered with short hairs especially in lower part; radical and lower cauline leaves simple-pinnate, oblong, 8–10 cm long, 0.4–2 cm wide; leaflets on distinct petiolules, reniform, entire or 2-lobed, acutely and unequally toothed; median cauline leaves bipinnatifid, with lanceolate-linear and linear lobes, sessile on narrow sheath; uppermost leaves small, simple-pinnate, with linear lobes. Umbels 3–4 cm across, of 15–17 thin, slightly scabrous nearly equal rays; involucre absent or of 1 linear leaflet, shorter than umbel rays; umbellets of 2–3 linear leaflets with narrow scarious ciliate margin; petals white, ca. 1 mm long, dorsally slightly bristly-haired, hardly notched, with inward tip; ovary hairy; fruit not known. July.

Dry slopes. — Caucasus: S. Transc. Gen. distr.: As. Min. Described from Ol'ta district. Type in Leningrad.

24. *P. korshinskyi* Schischk. in Bot. mat. Gerb. Bot. inst. AN SSSR, XIII (1950) 160.

Perennial; root ascending, 0.5 cm thick, branching above, multicapital; stems few, 80–90 cm high, straight, branching, thin-haired, more or less furrowed; radical and lower cauline leaves with long petioles nearly as long as blade, abruptly expanding to amplexicaul sheath, their blade oblong, 12–15 cm long, ca. 6 cm wide, with 3–4 pairs of remote, subrounded, cordate or cuneate, entire or deeply 3-lobed, sometimes 3-partite, unequally and acutely toothed, 1.5–2.5 cm long and nearly as wide leaflets, with petiole and nerves, especially beneath covered with short hairs. Umbels 1.5–4 cm across, terminating stem and branches, of 2–5 unequal short-haired rays; involucre and involucels of 3–5 linear acuminate leaflets; umbellets

445 many-flowered, 5–7 mm across; calyx-teeth inconspicuous; petals greenish-whitish, ca. 0.75 mm long, with acute inward curved tip, dorsally densely hairy; young fruit subglobular, densely hairy; stylopodium pulviniform, with undulant margin; styles divergent, nearly as long as stylopodium is wide. August.

Stony slopes. — Centr. Asia: Pam.-Al. (E.). Endemic. Described from Kara Kul Lake, 4,000 m. — Type in Leningrad.

Genus 1015. **ANISUM** * Gaertn.

Gaertn. De Fruct. I (1788) 102, tab. 23

Calyx-teeth inconspicuous; petals white, hairy outside, ovary abruptly tapering at base; stylopodium short-conical; fruit difficult to distinguish, asymmetrical, ovoid, attenuate above; mericarps with 5 equidistant, filiform ribs; mesocarps thin, nearly membranous, canals under vallecule 4-8, forming a somewhat irregular circle, 2-4 toward commissure, markedly flattened in cross section. Annuals, with entire rounded-reniform lower leaves and pinnate upper leaves.

Two species in the Mediterranean area.

1. *A. vulgare* Gaertn. De Fruct. I (1788) 102. — *A. officinarum* Moench, Meth. (1794) 100. — *Pimpinella anisum* L. Sp. pl. (1753) 264; Boiss. Fl. or. II, 866; Shmal'g., Fl. I, 394; Wolff in Engl. Pflanz. IV, 228 (1927) 232. — *Apium anisum* Crantz, Cl. Umbell. emend. (1767) 101. — *Sison anisum* Spreng. in Ges. Naturf. Fr. Berl. Mag. VI (1812) 260. — *Tragium anisum* Link, Enum. pl. Horti berol. I (1821) 285. — *T. aromaticum* Spreng. et Hoffm. ex Hayne, Getr. Darst. VII (1822) tab. 22. — *Carum anisum* Baill. Hist. pl. VII (1880) 119, 178. — *Selinum anisum* E. H. L. Krause in Sturm, Fl. Deutschl. 2 Aufl. 12 (1904) 56. — Ic.: Kom., Sbor, sushka i razved. lek. rast. izd. 3, tabl. 3. (1917).

Annual; usually entire plant covered with thin short spreading hairs; root thin, fusiform; stem 20-50 cm high, straight, cylindrical, furrowed, branching above; lower cauline leaves petioled, rounded-reniform, entire, incised-dentate or lobed, of 3 rounded-cordate leaflets, the lateral on short, the terminal on longer petiolules; subsequent leaves with obcuneate, often 2-lobed lateral and 3-lobed terminal leaflets; upper leaves sessile on narrow
446 sheath, bi- or tripinnate, with linear-lanceolate lobules; uppermost leaves 3-partite or entire. Umbels 2.5-6 cm across, of 7-15 rays with short spreading hairs; involucre absent or 1-leaved; leaflets of involucels filiform, 1 to few; petals white, ca. 1.5 mm long, with ciliate margin, dorsally with short-bristly hairs, with inward curved tip; fruit broadly cordate-ovoid or ovoid or obpyriform, 3-5 mm long, slightly compressed laterally, with faintly protruding dorsal ribs; canals 4-8 under valleculae, forming nearly continuous ring, 2-4 canals toward commissure; stylopodium conical, styles recurved, half as long as fruit. June-July.

Cultivated in southern regions. — European part: Bl., L. Don, M. Dnp., V.-Don; Caucasus: everywhere; Centr. Asia: everywhere. Gen. distr.: known only in cultivation, locally escaped in moderately warm regions of the globe. Described from Europe. Type in London.

Economic importance. The fruit contains 2.4-3.2% essential oil, extracted by distillation with steam; anethole ($C_{10}H_{12}O$) accounts for 80-90% of the oil yield. The oil has an aromatic odor and a sweet-spicy taste. It is used in the making of perfumes, liqueurs, and in the food industry. Bakeries often use the fruit in powdered form. The oil cake is rich in nutrients, 17-20% protein and 16-22% fat, and provides excellent fodder for cattle.

* From the Greek term for anise — anison.



PLATE XXIX. 1 — *Reutera bobrovii* Woron.; 2 — *R. aurea* DC.

Note. Though the exact origin of this plant is unknown, many consider it a native of the Near East. It is mentioned by the ancient Greeks, Theophrastus and Dioscorides, and those following them. Some authors (DeCandolle, Calestani and others) regard *Anisum creticum* as the ancestor.

Genus 1016. **REUTERA*** Boiss.

Boiss. Elench. (1838) 46 et Voy. Esp. I (1839—1845) 242. — *Pimpinella* 3. *Reutera* Benth. in Benth. et Hook. Gen. pl. I (1867) 893. — *Apium* sect. V *Reutera* Calest. in Webbia, I (1905) 176, exp.

Calyx-teeth inconspicuous; petals ovate, nearly entire, with inward curved apex, yellow; fruit ovoid or oblong, compressed laterally; mericarps with 5 inconspicuous filiform ribs, canals 2—3 under valliculae; 449 albumen flat toward commissure. Perennial herbs, with simple or bipinnate leaves.

About 10 species in the Caucasus, Central Asia, Asia Minor, Iran and Afghanistan.

1. Plant 80—120 cm high, radical leaves 2—10 cm long, 0.5—2 cm wide 2. *R. bobrovii* Woron.
- + Plant 30—50 cm high, radical leaves oblong, 40 cm long, 30 cm wide 1. *R. aurea* (DC.) Boiss.

1. *R. aurea* (DC.) Boiss. Fl. or. II (1872) 863. — *R. cervariaefolia* Boiss. in Ann. Sc. Nat. 3 ser. Bot. I (1844) 134. — *R. flava* Boiss. l. c. (1844) 134. — *Pimpinella aurea* DC. Prodr. IV (1830) 120; Ldb. Fl. Ross. II, 256; Wolff in Engl. Pflanzenr. IV, 228 (1927) 226. — *P. flava* C. A. M. Verzeichn. Pfl. cauc. (1831) 122. — Ic.: H. Wolff, l. c. f. 19.—

Perennial; entire plant covered with short velutinous hairs; root 1—1.5 cm thick, its neck densely covered with dark brown leaf remnants; stem 80—100 cm high, straight, bearing profusely branching spreading branches; radical leaves ovate, to 40 cm long, bipinnatisect, with 8—10 pairs of primary lobes, to 20 cm in length, the lower on petioles (to 10 cm long), the upper sessile; lobes of the second order thinly coriaceous, very remote from each other, ovate-oblong, nearly entire, deeply incised or dentate-lobate, the largest to 2 cm long; upper leaves smaller, less dissected. Umbels many, 2—3 cm across, on short peduncles, of 3—8 short thickish strong, nearly equal rays; involucre and involucels absent; umbellets 5—8-flowered; pedicels unequal, thickening in fruit; petals golden yellow, subrounded, with short inward curved tip, ca. 1 mm long, dorsally hairy or glabrous; fruit subglobular, somewhat geminate, woolly-velutinous when young, subglabrous when ripe, 2 mm long, 1.75 mm wide; stylopodium short-conical; styles twice as long as stylopodium, becoming spreading. June—July. (Plate XXIX, Figure 2.)

Slopes. — Caucasus: E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. Gen. distr.: Arm.-Kurd. (?), Iran. Described from N. Iran. Type in Geneva.

* Named after Reuter, curator of the herbarium in Geneva.

2. *R. bobrovii* Woron. sp. nov. in Herb., description in Addenda XV, 599.

450 Perennial; root rather thick, multicapital; stems many, 30–50 cm high, ascending at base, in lower part densely covered with long persistent petioles, very short velutinous hairy, spreading-branching nearly from base, few stems simple; radical leaves numerous, oblong, 2–10 cm long, 0.5–2 cm wide, simple or bipinnate, with petioles nearly as long as blade, primary lobes petioluled, broadly ovate, usually 3-lobed, lobes covered with short hairs with few large obtuse or acutish teeth; upper leaves smaller, the uppermost reduced to oblong sheath, without blade. Umbels 1–1.5 cm across, of 3–4 nearly equal short-haired rays; involucre and involucels absent; calyx-teeth inconspicuous; petals greenish-yellowish, hardly notched dorsally densely hairy, ca. 1 mm long; ovary and fruit densely hairy; stylopodium flattened-conical; styles recurved, $1\frac{1}{2}$ –2 times as long as stylopodium; ripe fruit not known. May – June. (Plate XXIX, Figure 1.)

Cliffs 800–1,300 m. – Centr. Asia: Mtn. Turkm. (Greater Balkhan). Endemic. Described from Greater Balkhan Range. Type in Leningrad.

Genus 1017. **ALBOVIA** * Schischk.

Schischk. in Addenda XV, 433. – *Scaligeria* DC. *Mém. Ombell.* (1829) 70, ex.p.; *Scaligeria* sect. *Euscaligeria* Boiss. *Fl. or.* II (1872) 875, p.

Flowers bisexual; calyx-teeth inconspicuous; petals white, notched-2-lobed, hardly enlarged in peripheral flowers; fruit geminate, ovoid-globose, slightly flattened laterally; mericarps without prominent ribs, obscurely rugose; 2–3 canals under valleculeae; carpophore 2-partite. Perennial, short-haired herbs, with rounded crenate or shallowly 3-lobed leaves.

Three species, endemic to the Caucasus and Asia Minor.

1. *A. tripartita* (Kalenicz.) Schischk. comb. nov. – *Pimpinella rotundifolia* M. B. *Fl. taur.-cauc.* I (1808) 242, non Scop. *Fl. Carniol.* ed. 2, I (1772) 208; DC. *Prodr.* IV, 119; Ldb. *Fl. ross.* II, 254. – *P. tripartita* Kalenicz. in *Bull. Soc. Nat. Mosc.* XVIII (1845) 231. – *Sison rotundifolium* Spreng. in *Ges. Naturf. Fr. Berl. Mag.* VI (1812) 260. – *Conopodium rotundifolium* Benth. et Hook. *Gen. Pl.* I (1862–1867) 896; Shmal'g., *Fl. I*, 425. – *Scaligeria rotundifolia* Boiss. *Fl. or.* II (1872) 876; Grossg., *Fl. Kavk.* III, 140. – Exs.: *Pl. cauc. exs.* n°238. –

451 Perennial; rhizome ascending or horizontal, 0.5–1 cm thick; stems 50–100 cm high, few or single, erect, branching from middle, thinly ribbed, the lower half densely covered with short hairs, upper part more sparsely hairy; radical leaves early withering, with long more or less hairy petioles, their blade rounded, deeply cordate, entire or ternate-dissected,

* After N.M. Al'bov (1866–1897), a noted Russian botanist, who explored the Caucasus, Argentina and Tierra del Fuego.

irregularly rounded-dentate at base, 4–8 cm long and as wide, with short hairs on both sides, mostly along nerves above; lower cauline leaves long-petioled, similar to radical, entire or 3-partite, the upper with short petioles, smaller blade. Umbels terminating stem and branches, 4–10 cm across, of 8–16 thin cylindrical, unequal glabrous rays; involucre and involucels absent; umbellets loose, 10–13-flowered, 4–10 mm across; calyx-teeth inconspicuous, petals white, obovate, notched, with inward curved lobe, ca. 1 mm long, peripheral petals hardly elongated; fruit geminate, 2–2.5 mm long, 3 mm wide, stylopodium short-conical, styles recurved, shorter than stylopodium, mericarps ovoid, indistinctly ribbed. Fl. May–July, Fr. August. (Plate XVII, Figure 1.)

Forests, shrubs, stony slopes. — Caucasus: Cisc., W., E. and S. Transc., Tal. Gen. distr.: As. Min. (Pontus Range), Iran. (NW). Described from N. Caucasus. Type in Moscow?

Genus 1018. **AEGOPODIUM*** L.

L. Sp. pl. ed. 1 (1753) 265. — Podagraria Hill, Brit. Herb. (1756) 406. — Carum (Aegopodium) Baill. Hist. pl. VII (1880) 119. — Pimpinella 6. Aegopodium O. Ktze. in Post et O. Ktze. Lex. gen. phan. (1903) 439. — Apium Sect. VII Aegopodium Calest. in Webbia, I (1905) 179; Wolff in Engl. Pflanzentr. IV, 228 (1927) 327.

Calyx-teeth inconspicuous, petals white (rarely reddish), obcordate, more or less deeply notched with inward curved tip, fruit oblong-ellipsoid or ovoid, compressed laterally, with thin filiform ribs, canals under valleculeae obsolete in ripe fruit, replaced by a cylindrical layer of large celled tissue underlying the epidermis, albumen flat or slightly inflated toward commissure, carpophore 2-partite. Perennial herbs, with large biternate or ternate-pinnate leaves.

Seven species in Europe and Asia.

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1. Leaves more or less pubescent beneath (especially along veins), biternate; rays of umbels and umbellets stiff-scabrous above. 2.
- + Leaves glabrous on both sides, ternate-pinnate; rays of umbels and umbellets glabrous or slightly scabrous. 3.
2. Umbels of 20–25 rays; fruit oblong, 3–4 mm long. . 1. **A. podagraria** L.
- + Umbels of 8–12 rays; fruit ovoid, 2 mm long (Far East) 5. **A. brachycarpum** (Kom.) Schischk.
3. Blade of radical leaves ternate-pinnate or bipinnate, leaflets small, 1–2 cm long, 0.5–1.5 cm wide. 4. **A. alpestre** Ldb.
- + Blade of radical leaves ternate or pinnate, leaflets larger 4–11 cm long, 2–7 cm wide. 4.
4. Blade of radical leaves ternate, with subrounded leaflets, umbels of 13–16 rays scabrous above, fruit 3–3.5 mm long (E. Siberia) . . . 2. **A. latifolium** Turcz.
- + Blade of radical leaves ternate-pinnate or biternate, leaflets ovate, acuminate, umbels of 15–20 rays, sometimes glabrous, fruit 4–6 mm long. 3. **A. tadshikorum** Schischk.

* From the Greek (genitive aegos) — goat, podion — foot.

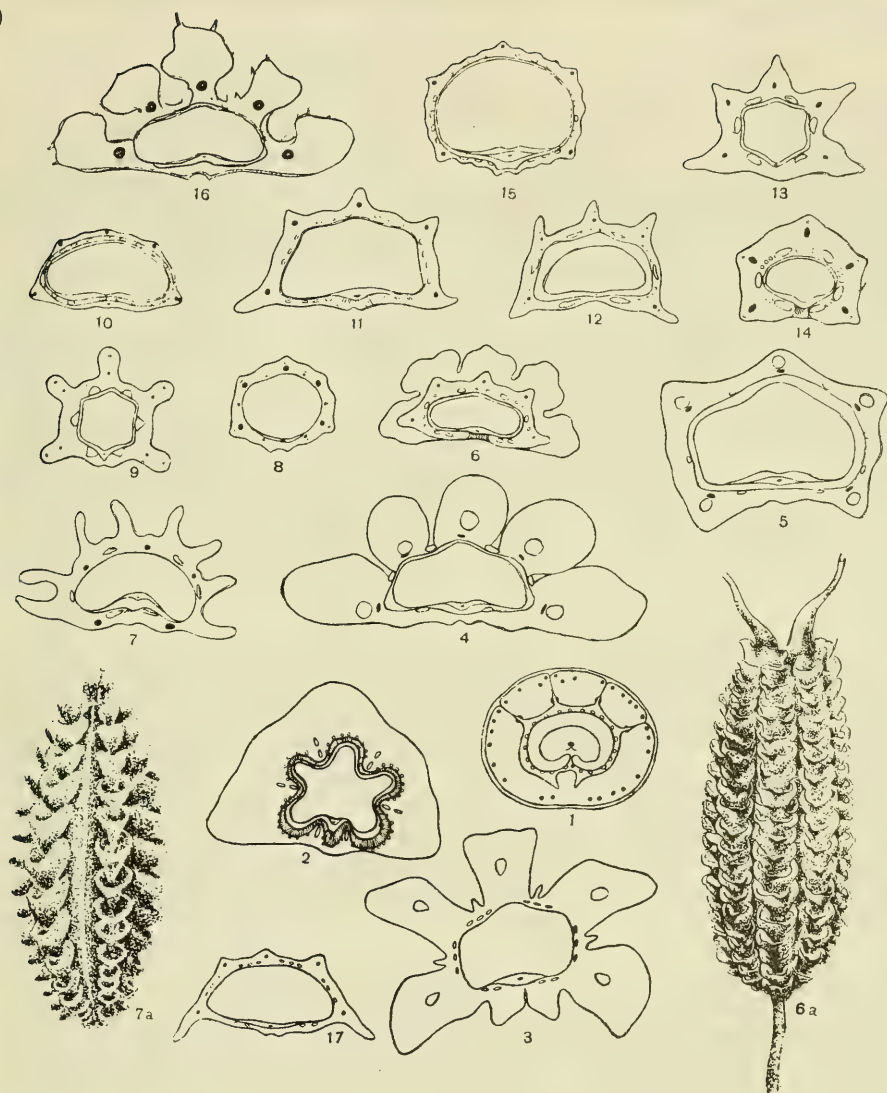


PLATE XXX. Cross section of mericarps (scheme) and fruit. 1—*Cryptodiscus didymus* (Rgl.) Korov.; 2—*Hohenackeria exscapa* (Stev.) K.-Pol.; 3—*Rumia crithmifolia* (Willd.) K.-Pol.; 4—*Ledebouriella multiflora* (Ldb.) Wolff.; 5—*L. seseloides* (Hoffm.) Wolff.; 6, 6a—*Ornopterum turcomanicum* (Korov.) Schischk.; 7, 7a—*Szovitsia callicarpa* Fisch. et Mey.; 8—*Froriepia subpinnata* (Ldb.) Baill.; 9—*Helosciadium nodiflorum* (L.) Koch.; 10—*Hymenolyma trichophylla* (Schrenk) Korov.; 11—*Ligusticum pumilum* Korov.; 12—*Hyalolaena jaxartica* Bge.; 13—*Seselopsis tianschanicum* Schischk.; 14—*Muretia fragrantissima* (Lipsky) K.-Pol.; 15—*Chamaescidium acaule* (M. B.) Boiss.; 16—*Stenocoelium athamantoides* (M. B.) Ldb.; 17—*Libanotis condensata* (L.) Crantz.

Series 1. *Podagrariae* B. Schischk. — Leaflets large, fruit oblong, 3–7 mm long.

1. *A. podagraria* L. Sp. pl. (1753) 265; Ldb. Fl. Ross. II, 247; Shmal'g., Fl. I, 392; Kryl., Fl. Zap. Sib. VIII, 2082. — *Ae. ternatum* Gilib. Fl. lithuan. II (1782) 41. — *Ae. angelicaefolium* Salisb. Prodr. (1796) 169. — *Ae. tribracteolatum* Schmalh. in Izv. Kavk. Geogr. Obshch (1892) 22; Berichte der deutsch. bot. Ges. (1892) 289; Somm. et Lev. in A. H. P. XVI (1900) 179; Wolff in Engl. Pflanzenr. IV, 228 (1927)
455 331. — *Ligusticum podagraria* Crantz, Stirp. austr. ed. 1, fasc. III (1767) 84. — *Seseli aegopodium* Scop. Fl. carniol. ed. 2, I (1772) 215. — *Sium Podagraria* Weber ex Wigg. Prim. Fl. Holsat. (1780) 24. — *S. vulgare* Bernh. Syst. Verz. Erf. (1800) 173. — *Pimpinella angelicaefolia* Lam. Encycl. Meth. I (1783) 451. — *P. Podagraria* Lestib. Bot. Belg. II (1827) 269. — *Tragoselinum angelica* Lam. Fl. franc. III (1793) 449. — *Podagraria aegopodium*. Moench, Meth. (1794) 90; Rupr. Fl. ingr. 442. — *P. erratica* Bubani, Fl. Pyren. II (1900) 351. — *Apium biternatum* Stokes, Bot. Mat. Med. II (1812) 150. — *A. podagraria* Caruel in Parl. Fl. ital. VIII (1889) 467. — *Sison podagraria* Spreng. in Ges. Naturf. Fr. Berl. Mag. VI (1812) 260. — *Carum podagraria* Roth, Enum. plant. Germ. I (1827) 946. — *Selinum podagraria* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 57. — *Idem*: Fedch. and Fler., Fl. Evrop. Ross. II, Fig. 565; Sornye rasteniya SSSR, III, Fig. 334. — *Exs.*: G. R. F. No. 1021; Pl. Finl. *exs.* No. 827 et No. 828. —

Perennial; stem glabrous or very short scabrous-hairy, 50–100 cm high, slightly furrowed, slightly branching above; lower leaves with long petioles (20–40 cm), broadly triangular, their blade 10–20 cm long, slightly wider, glabrous above, scabrous only along nerves, densely short-haired beneath, especially along nerves and leaf axes, biternate, i. e., each of 3 primary leaflets consisting in turn of 3 secondary leaflets; lateral leaves bi-partite, oblong-ovate, acutely serrate, short-petioluled, asymmetrical, 4–12 cm long, 1.5–7.0 cm wide; upper leaves smaller, their petioles shortly expanding to sheath, ternate, usually with 2-partite or entire lateral leaflets. Terminal umbel 7–9 cm across, of 20–25 fertile rays covered with very short stiff hairs; lateral umbels smaller, usually sterile; involucre and involucels absent, very rarely involucre of 1–3 leaflets (*var. tribracteolatum* (Schmalh.) Grossh.); umbellets 10–15 mm across; calyx-teeth inconspicuous, petals white, broadly obovate, deeply notched, ca. 1.5 mm long; fruit oblong, slightly compressed laterally, ca. 3 mm long, stylopodium conical, styles long, divergent at first, becoming recurved and appressed to fruit, often half the length of the fruit. May–July.

Forests, felled areas, among shrubs, gardens. — European part: everywhere except for L. V., very rarely in Crim.; Caucasus: Cisc., W. and E. Transc.; W. Siberia: everywhere; E. Siberia: Ang.-Say. (west of Yeniz.); Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Centr. Eur., Bal.-As. Min.; introduced in N. Am. Described from Europe. Type in London.

- 456 **Economic importance.** The young leaves are eaten as salad when raw; all parts of the plant are suitable for the making of borsch. According to Popov and Elkin, the fruit contains 10.5% raw protein, 7.9% protein, 3% fat,

48% nitrogen-free extractive substances, 28.4% cellulose, and 10.1% ash. The content of Vitamin C in the herbs is 39–44 mg/% in June–July, 65–109 mg-% in August – September.

2. *A. latifolium* Turcz. in Bull. Soc. Nat. Mosc. XVII (1844) 719; Fl. baic.-dahur. I, 470.

Perennial; rhizome ascending; stem furrowed, 40–70 cm high, slightly branching above, glabrous; radical leaves with long petioles (10–20 cm) passing into expanded sheath, their blade subrounded, 8–10 cm long and as wide, ternate-partite, sometimes pinnate with 5 leaflets, leaflets petioluled, usually entire, broadly ovate or subrounded, bilaterally hairy, 4–8 cm long, 3–7 cm wide, dentate with broadly triangular teeth terminated by short spine, paler beneath; cauline leaves few, pinnate, with lobed or ternate lower leaflets. Terminal umbel ca. 6 cm across, of 11–15 rays scabrous in upper part, lateral umbels smaller; involucre and involucels absent; umbellets 1.5 cm across, with glabrous rays; calyx-teeth inconspicuous; petals white, ca. 2 mm long, notched, with inward curved tip; fruit 3–3.5 mm long, 2–2.5 mm wide, stylopodium conical, styles nearly twice as long as stylopodium, recurved. June–July.

Taluses in shady ravines. – E. Siberia: Ang.-Say. (Lake Baikal, railway station Utulik and Khara-Murin). Endemic. Described from mountains near Baikal. Type in Leningrad.

3. *A. tadshikorum* Schischk. in Addenda XV, 434.

Perennial; entire plant glabrous; stem 70–100 cm high, furrowed, slightly branching above; lower leaves with long petioles (10–20 cm) passing into expanded sheath, their blade broadly triangular, 10 cm long, 15 cm wide, ternate or nearly bipinnate, primary lobes petioluled, leaflets entire, sometimes 2–3-lobed, acutely serrate, ovate, 4–11 cm long, 2–6 cm wide; cauline leaves 2–3, smaller and less deeply cut, on amplexicaul sheath. Terminal umbel 5–8 cm across, of 15–20 glabrous or subglabrous rays; lateral umbels smaller; involucre and involucels absent; umbellets 1–1.5 cm across, calyx-teeth inconspicuous, petals white, 2 mm long; fruit oval, 4–6 mm long, 3 mm wide, stylopodium conical, styles longer than stylopodium, recurved.

457 June – July.

Spruce and nut forests, near streams. – Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from Bol'dzhuan. Type in Leningrad.

Series 2. *Alpestria* Schischk. – Leaflets small, 1–4 cm long, 0.5–2 cm wide, fruit broadly oval, 3 mm long, 2.5 mm wide.

4. *A. alpestre* Ldb. Fl. alt. I (1829) 354; Fl. Ross. II, 248; Turcz. Fl. baic.-dahur. I, 470; Kryl., Fl. Zap. Sib. VIII, 2083. – Carum alpestre K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXIX (1915) 199. – Ic.: Ldb. Ic. pl. Fl. Ross. I, tab. 7. – Exs.: G. R. F. No. 2601.

Perennial; entire plant glabrous; stem 20–70 cm high, simple or slightly branching above, slightly furrowed; leaves triangular, the radical with 5–20 cm long petioles, their blade 5–12 cm long and nearly as wide, ternate-pinnate or nearly bipinnate, with petioluled primary lobes, secondary lobes pinnatifid or entire, acutely serrate, ovate or oblong-ovate, 1–4 cm long, 0.5–2 cm wide; cauline leaves 2–3, smaller and less deeply cut, on short

petioles expanding to sheath. Terminal umbel 4–8 cm across, of 10–15 subglabrous or slightly scabrous rays, lateral umbels 1–2, involucre and involucels absent; umbellets 1–1.5 cm across; calyx-teeth inconspicuous; petals white, 2 mm long; fruit broadly ovoid, 3 mm long, 2.5 mm wide; styles long, much longer than the short-conical stylopodium, recurved. June – August.

Mountain spruce and Siberian stone pine forests, subalpine and alpine meadows. — W. Siberia: Ob, Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Ze.-Bu., Uda, Sakh., Kamch.; Centr. Asia: Dzu-Tarb., T. Sh., Pam.-Al. (Alai Range). Gen. distr.: Sinkiang, Mongolia. Described from Altai (mountains near Leninogorsk (Ridersk), Belaya Uba and Charysh). Type in Leningrad.

Series 3. *Brachycarpae* Schischk. — Leaflets large, fruit small, broadly ovoid, ca. 2 mm long.

5. *A. brachycarpum* (Kom.) Schischk. comb. nov. — *Pimpinella calycina* var. *brachycarpa* Kom. Fl. Mansh. III (1905) 145. —

P. brachycarpa Nakai in Journ. Coll. Sci. Tokyo, XXVI, Art. 1 (1909) 261; Wolff in Engl. Pflanzenr. IV, 228 (1927) 280. — Ic.: Kom. and Klob.-Alis., Opr. rast. Dal'nevost. kr. tabl. No. 244.

Perennial; rhizome horizontal or ascending; stem single, 60–80 cm high, glabrous, scabrous only under umbel, simple or slightly branching above, ribbed; leaves biternate, the lower with petioles as long as blade 458 or longer, blade broadly triangular, 15–20 cm long and as wide; primary lobes petioluled, 2–5 cm long, secondary lobes subsessile, ovate, 6–11 cm long, 3–5 cm wide, thinly acuminate, scabrous bilaterally and along nerves, unequally largely serrate-dentate, with ovate obtuse teeth with short mucro. Umbel 2.5–5 cm across, the 8–12 nearly equal rays acutely scabrous above; involucre and involucels absent; umbellets ca. 1 cm across; pedicels scabrous; petals white, subrounded, notched, with inward tip; fruit broadly ovoid, ca. 2 mm long. July – August.

Mixed forests. — Far East: Uss. Gen. distr.: Jap.-Ch. (Manchuria, Korea). Described from Manchuria and N. Korea. Type in Leningrad.

Genus 1019. *SIUM** L.

L. Sp. pl. (1753) 257, exp. — *Sisarum* Mill. Gard. Dict. ed. 8 (1768). — *Drepanophyllum* Hoffm. Gen. Umbell. ed. 1 (1814) 109, exp.: K.-Pol. in Bull. Soc. Nat. Mosc. n.s. XXVIII (1915) 181. — *Berula* Hoffm. ex Bess. Enum. pl. Volhyn. (1822) 44. — *Sium* Sect. 1 *Sisarum* DC. Prodr. IV (1830) 124. — *S.* subgen. 1 *Eusium* (Endl.) Drude in Engl. Pflanzenfam. III, 8 (1898) 197.

Calyx 5-toothed, teeth with long or short subulate mucro (often irregular in one and the same flower); petals white, with numerous nerves, broadly obovate, broadly notched, with inward curved lobe; fruit ovoid, compressed laterally; stylopodium conical, styles divergent or becoming recurved; mericarps with thin filiform prominent ribs; canals deep under valliculae or 1–3, superficial; albumen flat toward commissure or slightly carinate. Perennial herbs, with simple-pinnate leaves, growing along edge of water bodies.

* From the Greek *sion* — Theocritus' and Dioscorides' name for an umbellifer growing in water; others derive it from the Celtic *siw*, meaning water.

About 10 species in Europe, Asia and Africa.

1. Petioles of leaves, especially the lower, with transverse septa easily visible from the outside; radical leaves often with blade dissected into filiform lobules (leaves submerged in water) 2.
- + Petioles of leaves without transverse septa, strongly dissected submerged leaves not present 4.
- 459 2. Small plant, 30–70 cm high, never with multipinnatisect submerged leaves (Centr. Asia) 6. *S. medium* Fisch. et Mey.
- + Larger plant, 70–120 cm high, often with thinly dissected submerged leaves 3.
3. Leaflets narrow, 0.5–1 cm (E. Siberia and Far East) . 2. *S. suave* Walt.
- + Leaflets wider, 1–2.5 cm (European part and W. Siberia). 1. *S. latifolium* L.
4. Umbel of 6–8 rays; stem thin; radical leaves and leaves of sterile shoots often entire (Far East). 3. *S. tenue* Kom.
- + Umbel of 10–15 rays; stem ca. 1 cm across, all leaves usually pinnate 5.
5. Root strongly thickened, 1–2 cm thick, to 20 cm long (cultivated) 5. *S. sisarum* L.
- + Root not thickened, not more than 4–5 cm long. . . 4. *S. sisaroideum* DC.

Section 1. *EUSIUM* Endl. Gen. pl. (1838) 772. — *Sium* Sect. 1 *Sia genuina* Koch, Syn. Fl. Germ. et Helv. ed. 1 (1837) 228. — *Sium* sub. gen. 1 *Eu-sium* Drude in E. — P. Pflanzenfam. III, 8 (1898) 197 ex p. — Sect. *Eudrepanophyllum* et Sect. *Aphanocalyx* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXVIII (1914) 181, 182. — Branches of carpophore adnate to mericarps.

1. *S. latifolium* L. Sp. pl. (1753) 254, var. excl.; Ldb. Fl. Ross. II, 259; Turcz. Fl. baic.-dahur. I, 474; Shmal'g., Fl. I, 387; Kryl., Fl. Zap. Sib. VIII, 2020; Grossg., Fl. Kavk. III, 163. — *S. lancifolium* Schrank, Bayer. Fl. I (1789) 556, non M. B. (1808). — *S. berula* J. F. Gmelin, Syst. (1791) 482. — *S. sulcatum* Pers. Syn. I (1805) 316. — *S. longifolium* J. et C. Presl, Fl. cech. (1819) 65. — *Coriandrum latifolium* Crantz, Stirp. Austr. (1767) 219. — *Cicuta latifolia* Crantz, Cl. Umbell. Emend. (1767) 97. — *Drepanophyllum palustre* Hoffm. Gen. Umbell. ed. 2 (1816) 110. — *D. latifolium* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXVIII (1914) 182. — *Sisarum palustre* Bubani, Fl. pyren. II (1900) 359. — *Selinum sium* E. H. L. Krause in Sturm, Deutschl. Fl. ed. 2, XII (1904) 31. — *Ис.*: Syreishch., III. Fl. Mosk. gub. II, p. 404; Fedch. and Fler., Fl. Evrop. Ross. II, Fig. 566.

Perennial; root fibrous; stem 70–120 cm high, erect, acutely ribbed, branching above, usually with creeping underground shoots; lowermost leaves submerged, bipinnate, with thin filiform lobules; aerial leaves simple-pinnate, 15–30 cm long, ca. 10 cm wide, with 2–6 pairs of oblong
 460 or lanceolate sessile finely serrate leaflets asymmetrical at base, 5–10 cm long, 1–2.5 cm wide, petioles hollow, divided by septa into chambers. Umbels 6–12 cm across, of 10–14 nearly regular smooth rays; involucre of 2–6 lanceolate thinly acuminate reflexed leaflets; umbellets 10 mm



PLATE XXXI. 1—*Sium suave* Walt.; 2—*S. sisaroides* DC.; 3—*S. tenue* Kom.

across; involucels multileaved; calyx-teeth oblong or linear-oblong, acute, 0.15 mm long, green, deciduous in ripe fruit; petals white, 2-3 times as long as calyx-teeth, broadly obovate, notched; fruit 3-3.5 mm long, 2.5-3 mm wide, carpophore 2-partite. June-July.

Banks of streams, oxbow-lakes, lakes and marshes.— European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., Balt., U. Dnp., U. V., V.-Kama, M. D., V.-Don, L. Don, Transv., L.V. (?); Caucasus (rarely): Cisc., W. and E. Transc.; W. Siberia: Ob, U. Tob., Irt.; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp. **Gen. distr.:** Scand., Centr. and Atl. Eur., Bal., Med., Australia (introduced). Described from Europe. Type in London.

Economic importance. The fruit of *Sium latifolium* L. contains 2.5-6% essential oil; d-limonene accounts for about 80% of this. The entire plant is poisonous, especially the roots.

2. *S. suave* Walt. Fl. Carol. (1788) 115.— *S. cicutifolium* Schrank, Baier. Fl. (1789) 558; Ldb. Fl. Ross. II, 260; Kom., Fl. Man'chzh. III, 150.— *S. lineare* Michaux, Fl. bor.-amer. I (1803) 167.— *S. tenuifolium* Muhl. Cat. (1813) 31.— *Cicuta dahurica* Fisch. in Cat. Horti Gorenk. ed. 2 (1812) 45, nom. nud.; Schult. Syst. veg. VI (1820) 453.— *Critamus dahuricus* Hoffm. Gen. Umbell. ed. 2 (1816) 184; Turcz. Fl. baic.-dahur. I, 476.— *Falcaria dahurica* DC. Prodr. IV (1830) 110.— *Apium cicutaeifolium* Benth. et Hook. ex Forbes et Hemsley in Journ. Linn. Soc. XXIII (1887) 328.— *Drepanophyllum lineare* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXVIII (1915) 182.— **Ic.:** Britt. u. Brown, III. Fl. II, 532; Sugaw. Fl. of Saghal. III, tab. 638.— **Exs.:** G. R. F. No. 2646.

Perennial; roots in bundles, short, rather thick, numerous; stem strong, glabrous, ribbed, erect, simple or branching; submerged leaves, if present, bipinnate, with thin linear acute approximate lobules; lower leaves on long hollow petioles with transverse septa, as long as blade, the blade oblong, pinnate, with 3-9 pairs of remote, sessile, narrowly linear, linear, lanceolate-linear or ovate-lanceolate, 4-15 cm long, 0.5-1 cm wide (var. *angustifolium* Kom.), largely or finely toothed
463 leaflets; upper leaves smaller, sessile, with narrower leaflets. Umbels 4-8 cm across, of 8-20 glabrous rays; leaflets of involucre narrowly linear, numerous; umbellets 8 mm across; involucels multileaved; calyx-teeth inconspicuous; petals white; fruit globose, ca. 3 mm long, slightly flattened laterally, with 5 winged ribs; canals 1-3 under valleculae, 2-6 toward commissure. June-July. (Plate XXXI, Figure 1.)

Marshes, swampy, sometimes solonetzic meadows, damp high mountain meadows, banks of lakes, oxbow-lakes. — E. Siberia; Ang.-Say., Dau., Lena-Kol.; Far East: Okh., Uda, Ze.-Bu., Uss., Sakh., Kamch. **Gen. distr.:** N. Am. Described from Carolina. Type in Washington.

3. *S. tenue* Kom. in Izv. Bot. Sada. XVI (1916) 174.— *S. cicutifolium* c. *tenue* Kom. Fl. Man'chzh. III (1907) 150; Wolff in Engl. Pflanzenr. IV, 228, p. 347.

Perennial; roots 3-5, fusiformly thickened; stem usually single, 20-100 cm high, erect, ribbed, branching; radical leaves and leaves of sterile

shoots sometimes entire, rounded or broadly ovate, their blade 1.2 cm long, 1 cm wide, acutely toothed or ternate, with ovate or lanceolate acutely toothed leaflets; cauline leaves pinnate, with 2–3 pairs of lanceolate or linear-lanceolate acutely toothed leaflets; petioles of lower and radical leaves without transverse septa. Umbels 2–4 (5.5) cm across, of 6–8 smooth rays; involucre of 5 narrowly lanceolate acute leaflets with scarious margins; umbellets 8 mm across, 10–20-flowered; leaflets of involucre 6, lanceolate, with scarious margin, thin-acuminate, recurved or spreading, shorter than umbellet; petals white, subrounded, with winged ribs, 2 mm long, ca. 1.5 mm wide (Plate XXXI, Figure 3.)

River valleys, peat bogs. — Far East: Uss. Endemic. Described from the Lefu River valley. Type in Leningrad.

Section 2. *Sisarum* (Mill.) DC. Prodr. IV (1830) 124, ex p. — *Sisarum* Mill. Gard. Dict. ed. 4 (1754); Adans. Fam. II (1763) 93. — *Berula* Hoffm. ex Bess. Enum. pl. Volhyn. (1822) 44. — *Sium* subgen. III *Sisarum* Thell. in Hegi, III. Fl. Mitteleur. V, 2 (1926) 1217. — Carpophore branches free, sometimes very thin.

4. *S. sisaroideum* DC. Prodr. IV (1830) 4. — *S. lancifolium* M. B. Fl. taur.-cauc. III (1819) 230, non Schrank (1789); Ldb. Fl. Ross. II, 260; Shmal'g., Fl. I, 387. — *S. latifolium ucrainicum* Fisch. Cat. Hort. Gorenk. ed. 2 (1812) 45. — *S. podolicum* Bess. ex Rchb. Fl. germ. exc. (1832) 479. — *S. lancifolium* var. *podolicum* Racz. in Zap. Kievsk. 464 Obshch. Estestv. XI (1890). — *Sium sisarum* var. *lancifolium* Thell. in Hegi, III. Fl. Mitteleur., V (1926) 1233; H. Wolff in Engl. Pflanzenr. IV, 228 (1927) 349. — *Berula lancifolia* Bess. Enum. pl. Volhyn. (1822) 44. — ? *Carum sisarum* Baill. Hist. pl. VII (1880) 179. — *Apium sisarum* var. *lancifolium* Calest. in Webbia, I (1905) 176. — *Pimpinella sisarum* var. *lancifolia* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXVIII (1915) 180. — *Sisarum sisaroideum* Schischk. in Kryl., Fl. Zap. Sib. VIII (1935) 2077.

Perennial; entire plant glabrous; root fibrous, thin, not more than 2 mm thick; stem 50–100 cm high, erect, ribbed, with creeping underground shoots; leaves simple-pinnate, with 2–3 pairs of leaflets, very rarely simple, with rounded-cordate blade, upper leaves ternate, leaflets of lower leaves ovate-lanceolate, 2–7 cm long, 1–3 cm wide, the terminal larger, cordate at base, the lateral asymmetrical at base, serrate-dentate, acute; leaflets of upper leaves lanceolate, long-acuminate, serrate-dentate. Umbels 3–5 cm across, of 10–15 smooth furrowed rays; involucre and involucrelets of 5–7 lanceolate-linear, thinly acuminate leaflets with white-scarious margins; calyx-teeth short, triangular, 1/6–1/8 mm long; petals white, obcordate, ca. 1 mm long, notched, with inward curved tip; fruit ca. 4 mm long, 2.5 mm wide. July–August. (Plate XXXI, Figure 2.)

Damp shores of bodies of water, flood plain, damp and also solonchak meadows, banks of rivers and swamps. — European part: U. Dns., M. D., V.-Don, V.-Kama, Transv., Bes., Bl., L. Don, L. V., Crim.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: U. Tob. (S.), Irt., Alt. (W.); Centr. Asia: Ar.-Casp., Balkh., Dzu-Tarb., Syr D., T. Sh., Pam.-Al., Mtn. Turkm. Gen. distr.: Iran. Described from N. Iran (Khoi Province). Type in Geneva.

5. *S. sisarum* L. Sp. pl. (1753) 251; DC. Prodr. IV, 124.—
S. sisarum α. *vulgare* Alef. Landwirtsch. Fl. (1866) 155.—*Seseli*
sisarum Crantz, Cl. Umbell. emend. (1767) 92.—*Pimpinella*
sisarum Jessen, Deutsche Excurs. Fl. (1879) 191.—*P. sisarum* var.
sativa K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXVIII (1914) 180.—
Carum sisarum Baill. Hist. pl. VII (1880) 179.—*Selinum sisarum*
 E. H. L. Krause in Sturm, Deutschl. Fl. ed. 2, XII (1904) 31.—*Apium*
sisarum b. *sativum* Calest. in Webbia, I (1905) 175.— *Ic.: Bois Des*
plantes alimentaires, I (1927) fig. 123, p. 241.

Perennial; similar to preceding species, from which it is distinguished by the numerous roots (10–15) elongating to 20–30 cm and thickened (1–2 cm), and the shorter stem (50–70 cm). July–August.

465 Known only in cultivation; widely cultivated as a vegetable throughout Europe as well as in Russia in the 15th and 16th centuries. Its roots are rich in sugar (6–8%) and are eaten cooked or roasted. The introduction of the potato nearly eliminated the cultivation of *S. sisarum* L. It is presumably derived from *S. sisaroides* DC. (see above).

6. *S. medium* Fisch. et Mey. in Suppl. ad Ind. IX sem. Horti Petropol. (1843) 19.—*S. lancifolium* Ldb. Fl. alt. I, 352, non M. B.—*Drepanophyllum medium* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXVIII (1914) 183.

Perennial; root fibrous; stem single, 35–80 cm high, 3–6 mm thick in lower part, angular-ribbed, slightly branching; radical leaves early withering; lower cauline leaves with long, upper with shorter, hollow petioles with transverse septa, their blade oblong, 12–25 cm long, 4–9 cm wide, with 3–4 pairs of lanceolate-ovate, 2.5–5 cm long, 0.5–1.5 cm wide, acute or acuminate, slightly acutely toothed leaflets with antrorse teeth. Umbels ca. 4 cm across (in flower), of 8–15 smooth rays; involucre of 7 linear recurved usually unequal acute leaflets with scarious margin, larger leaflets sometimes dentate-incised; leaflets of involucre linear, 3–5, shorter than umbel rays, acute, with scarious margin; calyx-teeth conspicuous; petals white, subrounded, ca. 1 mm long, with acute inward tip; fruit ovoid, 3.2 mm long, ca. 2 mm wide, with winged-thickened ribs; vallecule with equal narrow canals, stylopodium flat, styles short, ca. 0.3 mm long, recurved. July–August.

Banks of lakes and streams. — W. Siberia: Irt.; Centr. Asia: Balkh., T. Sh. Endemic. Described from Dzungaria and the Irtysh-Altai area. Type in Leningrad.

Note. *Sium cyminosma* Basin. is also recorded for the "Flora of the USSR" (ex Fisch., Mey. et Lallem. in Ind. IX sem. Horti Petropol. (1843) 138 et in Bull. phys.-math. Acad. Pétersb. II (1844) 204.—*Pimpinella cyminosma* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXVIII (1915) 180). As yet, this is known only by its fruits, obtained by Baziner in Central Asia, and preserved in the Herbarium of the V.L. Komarov Botanical Institute in Leningrad. These are cylindrical (5 mm long, 2 mm wide). There are no specimens of the plant itself.

466 Genus 1020. **BERULA** * Hoffm.

Hoffm. ex Bess. Enum. pl. Volhyn. (1822) 44; Koch in Röhl. Deutschl. Fl. II (1826) 25, 433.

Calyx-teeth subulate, usually conspicuous, petals white, broadly obovate, short-attenuate at base; fruit broadly ovoid, slightly flattened laterally; wall of fruit thickened everywhere, also under valleculae, developed as spongy floating tissue, with main ribs slightly protruding as broad flat bands, canals hidden from view, surrounding internal layer of fruit wall; umbels, at least partially, overtopping the lateral branches, apparently opposite to leaves, leaflets of involucre and involucels nearly herbaceous, green. Perennials with thinly furrowed stems and simple-pinnate leaves, with incised leaflets.

Three species in Europe, Asia Minor and Central Asia, Iran, the Caucasus and Africa.

1. Leaflets 2–3.5(7) cm long, 0.5–2(3) cm wide, tapering at base, irregularly and deeply toothed or incised, sometimes slightly lobed (European part of the USSR) 1. *B. erecta* (Huds.) Coville.
- + Leaflets 1–2(3) cm long, 0.5–1(2) cm wide, with broad base, finely crenate with nearly equal teeth 2. *B. orientalis* Woron.

1. *B. erecta* (Huds.) Coville, Contrib. from the Unit. St. Nat. Herb. IV (1893) 115.— *B. angustifolia* Mert. et Koch, Deutschl. Fl. II (1826) 433; Ldb. Fl. Ross. II, 258; Boiss. Fl. or. II, 889; Shmal'g., Fl. I, 386.— *Sium erectum* Huds. Fl. angl. (1762) 103.— *S. erectum* var. *macrodon* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXVIII (1914) 177.— *S. angustifolium* L. Sp. pl. ed. 2 (1763) 1672.— *S. berula* Guan, Fl. Monsp. (1765) 218.— *S. nodiflorum* Oed. Fl. Dan. (1794) 247, non L.— *S. incisum* Pers. Syn. I (1805) 316.— *Apium sium* Crantz, Stirp. Austr. (1767) 215.— *A. berula* Caruel in Parl. Fl. ital. VIII (1889) 463.— *Berula monspeliensis* Bubani, Fl. pyren. II (1900) 357.— *Selinum berula* E. H. L. Krause in Sturm, Flora, XII (1904) 32.— Ic.: Fl. Dan. tab. 247; Jacq. III. tab. 67; Cus. et Ansb. III. Fl. fr. X, tab. 130; Rchb. Ic. Fl. Germ. XXI, tab. 37; Sturm, Fl. XII, tab. 12.— Exs.: G. R. F. No. 2647.

- 467 Perennial; rhizome with underground shoots; entire plant glabrous, with a smell similar to that of celery; stem 20–100 cm high, subcylindrical, thinly furrowed, branching like petioles of lower leaves, hollow; leaves simple-pinnate, the lower with petioles to 30 cm long with 4–9 pairs of sessile, ovate-oblong, obtuse leaflets, usually with obliquely truncate base, often with 1 lobe at upper sometimes also at lower edge, 2–7 cm long, 1–3 cm wide, bifid-serrate with obtuse teeth, abruptly passing to cartilaginous antrorse mucro, lower pair of leaflets remote, smaller, terminal leaflet usually 3-lobed; upper cauline leaves smaller, sessile on expanded sheath with scarious margin, leaflets lanceolate, acute, or acuminate. Umbels in part opposite leaves, on short peduncles as long as umbel rays, of 10–20 glabrous unequal rays; leaflets of involucre and involucels numerous, herbaceous, lanceolate, entire or incised; calyx-teeth subulate, very distinct; petals white, broadly obcordate, ca. 1 mm long; fruit broadly ovoid, 2 mm long, 1.5 mm wide; stylopodium short-conical; styles recurved, longer than stylopodium. June – August.

* Derivation obscure; apparently from its popular French name — berle, from the Latin ferula — applied to many Umbelliferae.

Sides of ditches, banks of streams. — European part: Lad.-Ilm. (Leningrad), Balt., U. Dnp., M. D., V.-Don, L. V., L. Don, Bl., U. Dns., Bes.; Caucasus: Cisc., W., E. and S. Transc., Tal. **Gen. distr.:** W. and Atl. Eur., Bal.-As. Min., introduced into N. Am., Mexico, Australia. Described from England. Type in London.

2. *B. orientalis* Woron. nomen seminud. in Fl. Yugo-Vost. V (1931) 796. — *B. angustifolia* Boiss. Fl. or. II, 889, ex. p., non C. Koch. — *Sium erectum* β . *stenodon* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXVIII (1914) 177.

Perennial; entire plant glabrous; rhizome with underground shoots; stem 15–100 cm high, subcylindrical, thinly furrowed, branching nearly from base, rooting at lower nodes, like petioles of lower leaves hollow; lower leaves with short or long petioles, oblong, 10–20 cm long, 3–6 cm wide, simple-pinnate with 4–9 pairs of sessile, ovate or ovate-oblong, acute or obtuse, 1–3 cm long, 0.5–2 cm wide, finely crenate leaflets with nearly equal obtuse teeth, with short cartilaginous mucro and broad base, lower pair of leaflets reduced, far removed from the others, terminal leaflet usually 3-lobed; upper leaves smaller, sessile on expanded sheath with scarious margins. Umbels in part opposite leaves, on short peduncles as long as umbel rays or longer, of 10–20 unequal glabrous rays; leaflets of involucre and involucels multifoliate, herbaceous, often pinnatifid or dentate; styles divergent, longer than short-conical stylopodium. Fl. June–July, Fr. September.

Sides of irrigation ditches, near streams, in fields. — Centr. Asia: Balkh., Dzu-Tarb., T. Sh. (W.), Pam.-Al. **Gen. distr.:** Iran. (Iran, Afghanistan). Described from Centr. Asia. Type not known.

Note. In habit this plant so closely resembles *Helosciadium modiflorum* (L.) Koch that they are often confused. In addition to the distinctive fruits (indistinctly ribbed in *Berula*, sharply and prominently protruding in *Helosciadium*), the plants are easily distinguished at flowering by the well defined herbaceous involucre of *Berula*, contrasting with the complete absence of an involucre in *Helosciadium*.

Genus 1021. **CRITHMUM*** L.

L. Sp. pl. (1753) 246

Calyx-teeth very short, disappearing in fruit, petals yellowish- or whitish-green, subrounded, not notched, with narrow inward liguliform lobe, stylopodium conical, styles erect or slightly recurved, shorter than stylopodium, fruit broadly elliptic, nearly octagonal (in cross section) primary ribs 5, slightly protruding, acute, the lateral strongly developed, valliculae broad, wall of fruit a thick layer of spongy buoyant tissue containing air (fruit floats easily on water), canals numerous, forming a ring around endosperm. Perennial glabrous herbs, with woody base and pinnatisect leaves.

* From the Greek *crithaminos* — barley-like (*crithē* — barley), reflecting the resemblance of the fruit to grains of barley.

A monotypic genus growing along the shores of the Mediterranean and Black Sea, and the Atlantic Ocean (in Europe).

1. *C. maritimum* L. Sp. pl. (1753) 246; DC. Prodr. IV, 164; Ldb. Fl. Ross. II, 289; Boiss. Fl. or. II, 977; Shmal'g., Fl. I, 401; Grossg., Fl. Kavk. III, 164. — *Cachrys maritima* Spreng. in Ges. Naturf. Fr. Berl. Mag. VI (1812) 259. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 1900 (1863).

Perennial; entire plant glabrous; rhizome thick, branching above, multicapital; stem erect or ascending, 20–50 cm high, cylindrical, hollow, thinly furrowed, slightly branching above; leaves pale green, succulent, the lower with petioles expanding to sheath, ternate-bipinnate, pinnatifid, petiolate, 469 the sheaths broad, with membranous margins, with 2 short obtuse auricles; uppermost leaves 3-partite, sessile on sheaths, lobes all regular, lanceolate or linear-lanceolate, acute, slightly spinous, tapering at base, 2.5–5 cm long, 5–6 mm wide. Umbels of 10–20 rays; leaflets of involucre numerous, lanceolate or ovate-lanceolate incurved, with scarious margin; leaflets of involucre similar to those of involucre and as numerous; calyx-teeth very short; petals ca. 1 mm long; fruit ca. 6 mm long. July – August.

Rocky coastal slopes, coastal cliffs and sands. — European part: Crim. Caucasus: W. Transc. **Gen. distr.:** Med., E. and W. Described from the Atlantic coast of Europe. Type in London.

Economic importance. All parts of *C. maritimum* contain essential oil, including esters of thymol and dill apiol and a terpene-crithmene, in amounts varying with time and locality. The fruit yields 0.7–0.8%, the green parts 0.3–0.5%. The herbaceous parts also yield soda.

Genus 1022. **STENOCOELIUM** * Ldb.

Ldb. Fl. alt. I (1829) 297

Calyx-teeth conspicuous, acutely triangular, $\frac{1}{4}$ the length of the slightly downy petals with white outer side; fruit ovoid, slightly compressed dorsally, with thick obtuse, markedly protruding ribs, especially along ribs densely covered with stiff membranes, with narrow valleculeae between them; canals single under valleculeae, 2 toward commissure. Perennial high mountain herbs, with nearly leafless short stem and oblong bipinnate radical leaves.

Two species in the Altai and Sayan mountains, Saur, Tarbagatai and Mongolian Altai.

1. Plant covered with very short hairs, fruit with stiff membranes, not pubescent 1. *S. athamantoides* (M.B.) Ldb.
- + Plant covered with longer, thicker hairs, giving it a grayish-green appearance, fruit covered with short hairs 2. *S. trichocarpum* Schrenk.

* From the Greek *stenos* — narrow, *coelos* — hollow, referring to the narrow valleculeae.

470 1. *S. athamantoides* (M. B.) Ldb. Fl. alt. I (1829) 298; Ldb. Fl. Ross. II, 332; Kozo-Pol. in Fl. Az. Ross. XV, 18; Kryl., Fl. Zap. Sib. VIII, 2024.— *Cachrys athamantoides* M. B. Fl. taur.-cauc. III (1819) 217.— *Rumia athamantoides* DC. Prodr. IV (1830) 98.— *Seseli athamantoides* Benth. in Benth. et Hook. Gener. I (1862–1867) 903.— Ic.: Ldb. Ic. pl. Fl. Ross. II, tab. 175.

Perennial; root long, rather thick; stem often reduced, inconspicuous, and then umbel apparently borne on root or stem more or less elongate, 2–15 cm long, leafless or with 1–2 leaves, like the latter covered with short spreading stiff hairs, often stem, umbel rays and petioles violet; radical leaves numerous, their petioles expanding to sheath, the blade oblong, 3–7 cm long, 1–2.5 cm wide, bipinnate; secondary lobes subrounded ovate, pinnatisect into short lanceolate acute lobules. Umbels large, 8–15 cm across, of 9–12 irregular rays; involucre of 5–7 linear, nearly entire, scarious very short-haired acute leaflets; umbellets 1–1.5 cm across; involucre multifoliate, its leaflets lanceolate-linear or linear with membranous margins; calyx-teeth short-triangular; petals whitish or pale violet, obcordate, ca. 1.5 mm long; fruit 4–5 mm long, sometimes a saturated violet. June–August. (Plate XXX, Figure 16.)

Stony mountain slopes, rocks and alpine zone, glaciers, moraines and coastal pebbles. — W. Siberia: Alt.; E. Siberia: Ang.-Say. (Borus Mountain in the Sayans). Gen. distr.: Mongolia. Described from conglomerate along the tributary of Chuya River. Type in Leningrad.

2. *S. trichocarpum* Schrenk in Bull. phys.-math. Acad. Pétersb. I (1841) 80 et in Fisch. et Mey. Enum. pl. nov. II (1842) 42; Ldb. Fl. Ross. II, 332.— *Seseli trichocarpum* B. Fedtsch. Rast. Turkest. (1915) 616.

471 Perennial; root long, rather thick; stem nearly always absent, rarely to 7 cm high; umbels, often on 2–18 cm long peduncles, appear to issue from root; entire plant grayish-green from spreading stiff white hairs; leaves numerous, radical, expanding to sheath, violet in lower part, bipinnate, their petioles $\frac{1}{3}$ to $\frac{1}{2}$ the length of the blade, the blade oblong, 2–9 cm long, 1–3.5 cm wide; secondary lobes broadly ovate, pinnatisect into short ovate or lanceolate-ovate acute segments, 1–3 mm long, 0.5–1 mm wide. Umbellets 1–2 cm across; involucre multifoliate, leaflets linear acute with broadly scarious margin, as long as or longer than rays of umbellet; umbellet rays numerous, densely covered with short hairs; petals whitish, with violet middle part, short-haired outside; fruit 3.5 mm long, 2.5–3 mm wide, with stiff scarious processes and hairs along ribs. July.

Exposed southern and stony slopes in alpine zone, old moraines.— Centr. Asia: Dzu-Tarb. (Saur, Tarbagatai). Gen. distr.: Dzu.-Kash. (Sinkiang mountains). Described from Tarbagatai. Type in Leningrad.

Genus 1023. **LIBANOTIS** * L.

L. Cat. Pl. Gott. (1757) 226

Calyx-teeth lanceolate-subulate, often deciduous in fruit, slightly pubescent or glabrous, petals white, glabrous or dorsally pubescent, fruit broadly or narrowly ovoid, slightly compressed dorsally, stylopodium short-conical, styles recurved or erect, a few times as long as stylopodium, mericarps with 5 prominent ribs, pentagonal in cross section; canals under valliculae single, 2-4 toward commissure; albumen reniform in cross section, dorsally inflated, concave toward commissure. Rather large herbs, with ribbed-angular or cylindrical stem and bi- or tripinnate leaves.

Fifteen species in Asia and Europe.

1. Stems not developed, often prostrate, 4-20 cm long, producing several leafless flower-stalks from its neck 2.
- + Stems usually single, erect, leafy, 30-150 cm high 3.
2. Teeth or leaf lobes of the last order terminated by 1.5-2 mm long bristle 11. *L. setifera* (Korov.) Schischk.
- + Teeth or leaf lobes without apical bristle 12. *L. calycina* Korov.
3. Umbels very dense, subcapitate, surrounded by broad subrounded sheaths of uppermost leaves, rays, umbellets and involucre leaflets long-haired 13. *L. monstrosa* (Willd.) DC.
- + Umbels not as above 4.
- 472 4. Ovary and fruit glabrous or slightly scabrous 5.
- + Ovary and fruit more or less densely pubescent 6.
5. Styles erect or slightly divergent, nearly as long as fruit; stems 35-50 cm high, hollow; umbels of 15-16 glabrous rays (Centr. Asia) 10. *L. dolichostyla* Schischk.
- + Styles recurved, half the length of the fruit; stems 50-120 cm high, hollow; umbels of 20-30 rays pubescent above (Urals) 8. *L. sibirica* (L.) C. A. M.
6. Styles erect or divergent, nearly as long as fruit; umbels more or less dense 9. *L. condensata* (L.) Crantz.
- + Styles recurved, less than half the length of the fruit 7.
7. Leaves thickish, stiff, glabrous and shiny above; petals with bundles of hairs on the outside 1. *L. buchtormensis* (Fisch.) DC.
- + Leaves thin, not shiny above; petals with sparse simple hairs on the outside 8.
8. Leaves tripinnatisect, with linear-lanceolate, terminal lobules 5-10 mm long, 1-2 mm wide, main umbel 2-7 cm across, petals hairy outside (Dauria) 6. *L. seseloides* (F. et M.) Turcz.
- + Leaves bipinnatisect, sometimes nearly simple pinnate, terminal lobules broad, oblong to ovate, dentate, main umbel 7-12 cm across 9.
9. Stems to 50 cm high, from base up densely covered with spreading and semi-appressed hairs (Carpathians) 5. *L. montana* Crantz.
- + Stems 40-120 cm high, glabrous, or hairy only in lower half 10.

* From the Greek *libanotis* — the name of an umbellifer mentioned by Nicander, the roots of which produce a smell reminiscent of *ladanum*.

10. Radical and lower cauline leaves oblong, their blade 8–20 cm long, 2.5–3.5(5) cm wide, main umbel of 18–25 rays 3–5(6) cm across . . . 7. *L. schrenkiana* C.A.M.
- + Radical and lower cauline leaves triangular or broadly ovate, their blade 10–39 cm long, 10–30 cm wide, main umbel of 25–50 rays 5–12 cm across . . . 11.
11. Lower part of stem covered with rather long spreading bristles; leaves with short or long stiff hairs along nerves beneath (Far East) . . . 4. *L. amurensis* Schischk.
- + Entire stem, except inflorescence, glabrous or like leaves scabrous-hairy, but without stiff hairs in lower half . . . 12.
- 473 12. Petals in buds covered with thin hairs on the outside, usually violet when young; plant short-haired in lower part, 25–80 cm high, umbel rays hairy all over, involucre always present . . . 3. *L. transcaucasica* Schischk.
- + Stems 100–120 cm high, umbel rays hairy only above, involucre often absent, petals always white, glabrous; stems and leaves usually glabrous, rarely lower leaves and lower part of stem hairy. . . . 2. *L. intermedia* Rupr.

Section 1. ERIOTIS DC. Coll. Mém. V (1829) 48; Prodr. II, 149.—
Petals covered with short fascicular hairs on the outside, leaves coriaceous, thickish, shiny.

1. *L. buchtormensis* (Fisch.) DC. Coll. Mém. V (1829) tab. 3, f. 5; Prodr. IV (1830) 149; Ldb. Fl. Ross. II (1844) 278; Kryl., Fl. Zap. Sib. VIII (1935) 207.—*Bubon buchtormensis* Fisch. in Spreng. Pugill. II (1815) 55.—*Athamanta rigida* Hornem. Hort. Hafn. II (1815) 960.—*A. cervariaefolia* Schrad. ex Spreng. Pugill. II (1815) 56.—*Seseli buchtormense* Koch in Nov. Act. Nat. Cur. XII, 1 (1824) 111.—Ic.: DC. 1. c. tab. 3, f. 5.

Perennial; root thick, 1.5 cm across; neck covered with dark brown hairy leaf remnants; stem 20–80 cm high, 8–10 mm thick, cylindrical with fine acute ribs, glabrous, branching from middle or base; radical leaves numerous, oblong, with petioles 10–20 cm long, 3–5 cm wide, petioles rather long, distally canaliculate, proximally cuneate abruptly expanding to broad oblong-ovate sheath, the blade bipinnatisect, the lower primary lobes petioluled, the upper sessile, ovate, dissected into broadly ovate, irregularly acutely toothed, sessile or decurrent lobules; cauline leaves simple-pinnate, on short petioles gradually expanding to sheath; leaflets ovate or oblong-ovate, 2–4 cm long, 0.7–1.5 cm wide, pinnatifid into ovate-acuminate toothed lobules. Umbels 7–12 cm across, often few, with general aspect of loose corymbiform inflorescence, the rays 30–50, ribbed, short-haired; general involucre of 1–3 foliate leaflets, sometimes absent; umbellets many-flowered, 1–2 cm across; pedicels densely covered with short-hairs; leaflets of involucels 10–13, ovate-lanceolate, long-acuminate, scarious except for midrib, short-haired, nearly as long as pedicels; calyx-teeth linear-lanceolate, acute, half the length of the petals; petals whitish, 474 often lilac when young, subrounded, 1–5 mm long, short-haired outside,

with inward curved tip, tapering to short claw at base; fruit ovoid, 3.5–4.5 mm long, 2.5 mm wide, densely covered with very short stiff hairs. July – August.

Cliffs and stony slopes. – W. Siberia: Ob (SE), Alt., Irt.; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh., Dzu-Tarb., T. Sh. (E.). Gen. distr.: Mongolia (Sinkiang). Described from Bukhtarma River in W. Altai. Type in Leningrad.

Section 2. *EULIBANOTIS* DC. Coll. Mém. V (1829) 48; Prodr. II, 150. – Petals dorsally glabrous or with sparse simple short hairs, leaves not coriaceous, not shiny.

Series 1. *Angulatae* Schischk. – Stems markedly angular, leaves usually large.

2. *L. intermedia* Rupr. Diatrib. Petrop. (1845) 53. – *L. montana* var. *intermedia* Rupr. Fl. ingr. (1860) 445. – *L. sibirica* C.A.M. Verzeichn. Pfl. cauc. (1831) 124, non *Athamantia sibirica* L. (1753); Ldb. Fl. Ross. II (1844) 279, ex p.; Kryl., Fl. Zap. Sib. VIII (1935) 2069. – *Libanotis vulgaris* e. *sibirica* DC. Prodr. IV (1830) 150. – *L. montana sibirica* Patze, Mey. et Elk. Fl. d. Provinz. Preuss. Königsb. (1850) 441. – *Athamantia libanotis* γ. *sibirica* Schult. Syst. veg. VI (1820) 489. – *Ligusticum sibiricum* Spreng. Prodr. Umbell. (1813) 40. – *Seseli athamantoides* Ldb. Fl. alt. I (1829) 342. non *Libanotis athamantoides* DC. (1830). – *S. Libanotis* β. *sibirica* Schmalh., Fl. I (1895) 400, ex p. – Exs.: G.R.F. No. 1519.

Perennial; root 1–1.5 cm thick; stem 60–120 cm high, erect, strong, 4–10 mm thick in lower part, angular and strongly ribbed, glabrous or hairy below, branching; leaves stiff, green (paler beneath), glabrous or more or less hairy (var. *puberula* m.), simple or bipinnate, rarely nearly tri-pinnate; radical leaves with rather long petioles, with petioles 20–40 cm long, 10–15 cm wide, with sessile leaflets; upper leaves smaller, less dissected, sessile on short sheaths, glabrous, rarely very short scabrous-hairy. Umbels 5–12 cm across, of 25–50 rays short-haired above; involucre of 10–12 recurved linear scarious leaflets with short-ciliate margins or of 1–3 leaflets, often absent; umbellets many-flowered, 1–1.5 cm across; involucels of 12–15, linear acuminate, scarious leaflets, with glabrous or ciliate margins, nearly as long as slightly hairy umbel rays; calyx-teeth ovate-lanceolate, lanceolate or subulate, 0.5–1 mm long, slightly pubescent
475 or with short-ciliate margin, half the length of the glabrous white petals; fruit 3–4.5 mm long, short-haired. July – August.

Grass or mixed herb meadows, forest edges, thinned out forests, birch outliers, chalk and limestone slopes. – European part: all regions except for Kar.-Lap. and Crim.; W. Siberia: all regions; E. Siberia: Ang.-Say. Gen. distr.: Centr. Eur. (eastern part), Mongolia. Described from former Petersburg Province. Type in Leningrad.

Economic importance. G. V. Pigulevskii and N. V. Nazarenko (Botanical Institute im. V. L. Komarov) found the fruits to contain 0.1% essential oil,

comprising sesquiterpene $C_{15}H_{24}$, yielding azulene upon dehydrogenation. The oil contains no compound ethers or free spirits.

Note. Ruprecht (Fl. ingr. (1860) 445) noted that according to Linnaeus, *Athamanta sibirica* L. was a plant with glabrous fruits and pink petals, such as he (Ruprecht) had seen in Zlatoust. A similar plant, growing in the Urals, is presented below as *L. sibirica* L.

3. *L. transcaucasica* Schischk. in Grossg., Oprede. (1949) 231; Bot. Mat. Gerb. Bot. Inst. AN SSSR, XIII (1950) 161.— *L. montana* var. *lasiopetala* Bornm. in Verhandl. Zool.-bot. Gesellsch. in Wien, LX (1910) 120.— *Seseli Libanotis* var. *armeniaceum* Bordz. in Izv. Kievsk. Bot. Sada XII—XIII (1931) 132.

Perennial; root 0.7–2 cm thick, vertical or ascending, its neck covered with brown fibrous leaf remnants; stem single, 50–120 cm high, erect, branching above or nearly from base with obliquely antrorse branches, short-haired in lower half (rarely subglabrous), with spreading sparse hairs under inflorescence; radical leaves numerous, oblong or lanceolate, with long petioles, together with petioles 12–30 cm long, 2.5–5 cm wide, blade bipinnatisect, primary lobes sessile, the secondary lanceolate, acute, entire or with few teeth, petioles, margin of leaves and lower side of nerves short-scabrous-hairy, lower cauline leaves similar to the radical, the upper smaller, sessile on expanded sheath. Umbels 4–9 cm across, of 25–40 wholly pubescent rays; involucre of 11–13 lanceolate-linear thin and long acuminate, short-haired, usually recurved leaflets with scarious margin; umbellets 1–1.5 cm across, with hairy rays; involucels of 9–11 leaflets similar to those of involucre; calyx-teeth triangular-lanceolate; petals dark or light lilac when young, dorsally stiff-haired, becoming white and subglabrous; fruit densely covered with stiff hairs; stylopodium short-conical; styles recurved or divergent, longer than stylopodium. July–August.

Glades in mountain forests, southern slopes, subalpine meadows.—Caucasus: Cisc., E., W. and S. Transc. Gen. distr.: Arm.-Kurd., Iran. Described from Daralagez (Teke-Donduran Mountain). Type in Leningrad.

Economic importance. According to G. V. Pigulevskii and M. V. Nazarenko (Botanical Institute), the fruits contain 4% essential oil, which comprises geraniol alcohol (bound as compound ethers), hydrocarbon $C_{10}H_{16}$ —phellandrene, and sesquiterpene — $C_{15}H_{24}$, yielding azurine and libanotene upon dehydrogenation (Pigulevskii).

4. *L. amurensis* Schischk. in Bot. Mat. Gerb. Bot. Inst. AN SSSR XIII (1950) 160.— *L. montana* β . *Riviniana*? Ldb. Fl. Ross. II (1844–1846) 279, non *L. riviniana* Scop. (1772).

Perennial; root ca. 1 cm thick, its neck covered with brown fibrous leaf remnants; stem single, 50–100 cm high, erect, branching in upper half with obliquely antrorse branches, angular-ribbed, short-haired, or glabrous in lower part; radical leaves broadly triangular, tri- or nearly quadripinnatisect, 46 cm long, 32 cm wide, with short petioles; primary lobes petioluled, the secondary sessile, pinnatisect; lobes of the third order deeply dentate; cauline leaves similar to the radical, smaller, less deeply dissected, short-petioled or sessile on oblong sheath, leaves with ciliate margins and cilia on midribs, beneath scabrous along nerves above. Umbels 4–8 cm

across, of 15–25 hairy rays; involucre of 5–11 linear hairy leaflets, often recurved and caducous; umbellets many-flowered, 7–9 mm across, rays very short-haired, often only above; involucels of 5–11 linear-lanceolate or linear densely hairy leaflets; calyx-teeth triangular-subulate; petals in buds sometimes purple, turning white, usually glabrous on the outside; fruit ovoid, stiff-haired; stylopodium short-conical; styles twice as long as stylopodium, recurved; mericarps with 3 prominent ribs. July–September.

Among shrubs and illegal fellings. — E. Siberia: Dau. (?); Far East: Ze.-Bu., Uss. Gen. distr.: Manchuria. Described from near Khabarovka along the Amur. Type in Leningrad.

5. *L. montana* Crantz, Stirp. Austr. ed. 1, III (1767) 117. — *L. daucoides* Scop. Fl. carniol. ed. 2, 1 (1772) 193. — *L. vulgaris* DC. Prodr. IV (1830) 150, pro min. part.

- 477 Perennial; root thick, ca. 2 cm, vertical, its neck covered with coarsely fibrous brown leaf remnants; stem erect, 40–50 cm high, angular-ribbed, rather densely covered with short spreading and semi-appressed hairs, branching above, with obliquely antrorse branches; radical leaves numerous long-petioled, their blade triangular-ovate, 12–15 cm long, 6–8 cm wide, bi- or nearly tripinnatisect, lower primary lobes petioluled, the others sessile, lobes of the second order ovate, also pinnatifid into triangular-oblong acute teeth, covered with short spreading hairs, lower cauline leaves similar to the radical, the upper smaller. Umbels terminating stem and lateral branches, central umbel larger than the lateral, 6–7 cm across, of 30–35 densely hairy rays; leaflets of involucre linear, thinly acuminate, densely hairy, spreading or recurved, nearly half the length of the umbel rays; umbellets many-flowered, 1.2 cm across; leaflets of involucels numerous, acuminate, densely hairy, usually longer than umbellets; petals white, ovate, slightly notched, ca. 1 mm long, glabrous or with indistinct hairs on the outside; ovary densely covered with white hairs; fruit hairy. July–August.

Mountain slopes. — European part: U. Dns. (Carpathians). Gen. distr.: mountains of Central Europe. Described from the mountains of Austria. Type in Vienna.

Series 2. *Seseloideae* Schischk. — Stems cylindrical, more or less furrowed; styles recurved.

6. *L. seseloides* (Fisch. et Mey.) Turcz. Fl. baic.-dah. I (1844) 484. — *L. ugoensis* Sugaw. Fl. Saghal. III (1940) 1419, non Kitag. — *Ligusticum seseloides* Fisch. et Mey. ex Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 530, nom. nud.; Ldb. Fl. Ross. II, 285.

Perennial; root vertical or ascending, 0.5 cm thick, its neck covered with fibrous brown leaf remnants; stem glabrous, 30–120 cm high, densely stiff-haired only under umbel, sometimes at internodes, angular-ribbed or cylindrical, branching above, rarely simple, branches obliquely antrorse often overtopping main stem; radical leaves glabrous or short-haired along nerves and along margins, the long petioles exceeding blade, blade oblong,

ovate or broadly ovate, 3–26 cm long, 1.5(2)–20 cm wide, bi- or nearly tripinnatisect, lower primary lobes short-petioluled, the upper sessile, pinnatisect; secondary lobes deeply pinnatifid, with lanceolate or linear acute, 0.4–1 cm long, 1–3 mm wide lobules; lower cauline leaves similar to the radical, their petioles gradually expanding to sheath, upper leaves smaller, less dissected, sessile on expanded sheath. Umbels 2–7 cm across, of 20–60 nearly equal rays scabrous-hairy above; involucre absent or of 5–10 narrowly linear acute leaflets with scarious margins; umbellets ca. 1 cm across; pedicels hardly scabrous above; involucels of 10–13 linear acute leaflets sometimes as long as umbel; calyx-teeth triangular, short; petals white, broadly ovate, with inward curved tip, dorsally glabrescent; ovary and fruit short-scabrous-hairy; fruit ovoid, 3 mm long, 1.5 mm wide, the dorsal ribs narrowly winged, the lateral ones slightly wider; stylopodium conical; styles divergent or recurved, half the length of the fruit. July.

Steppes, meadows, shrubby thickets, thinned-out forests, birch forests. — E. Siberia: Ang.-Say. (western bank of Baikal, Goloustnoe village), Dau., Lena-Kol.; Far East: Ze.-Bu., Uda, Uss., Sakh. **Gen. distr.:** Jap.-Ch. (Manchuria). Described from Transbaikalia. Type in Leningrad.

7. *L. schrenkiana* C. A. M. in sched. ad Herb. Descr. in Addenda XV, 435. — *L. issykkulensis* B. Fedtsch. in herb. — *L. lipschitzii* M. Pop., Fl. Almaat. gos. zapov. (1940) 35, nom.

Perennial; root ca. 1.5–2 cm thick, its neck covered with dark brown leaf remnants; stems single or few, 40–110 cm high, erect, finely ribbed, branching above or from middle, its lower half covered with very short thick hairs; radical leaves oblong, with long short-haired petioles, their blade 8–20 cm long, 2.5–3.5 mm wide, bi- or nearly tripinnatisect, primary lobes sessile (the lower sometimes petioluled), these in turn pinnatisect into lanceolate, acute, entire sometimes deeply incised lobules, short-scabrous-hairy along margins and along ribs beneath, upper leaves similar to the radical, smaller, sessile on expanded sheath. Main umbels 3–6 cm across, the 18–25 rays hairy above, lateral umbels smaller, of 10–20 rays; involucre of 1–3 small leaflets or absent; umbellets ca. 1 cm across, many-flowered, with short-haired rays; involucels of 10–11 linear or narrowly lanceolate, acute, short-haired leaflets without scarious margins, nearly as long as umbellets; calyx-teeth triangular-lanceolate, early deciduous; petals glabrous, ovate; fruit 2 mm long, 1 mm wide, densely hairy; stylopodium short-conical; styles divergent or recurved, longer than stylopodium. July–August.

79 Mountain meadow slopes, near rocks, shrubby thickets. — Centr. Asia: Dzu-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Kuldja. Described from Central Asia. Type in Leningrad.

Note. C. Meier first drew attention to this plant; his specimens were grown at the St. Petersburg Botanical Garden in 1852, from seeds received from Schrenk. Meier labelled the plant *L. schrenkiana* C. A. M. and attached a brief description but failed to publish the new species.

8. *L. sibirica* (L.) C. A. M. in Verzeichn. Pfl. Cauc. (1831) 124, quo ad nom. — *L. montana* var. *gracilis* Kryl. in Tr. Obshch. estestvoisp. pri

Kazansk. univ. XI, 6(109).— *L. uralensis* Nevski in herb. Leninopol.—
Athamanta sibirica L. Sp. pl. (1753) 244.

Perennial; root rather thick, 1–2 cm, its neck covered with brown fibrous leaf remnants; stem single, 50–120 cm high, erect or slightly branching above, cylindrical, shallowly furrowed, glabrous; radical leaves numerous, oblong, with petioles shorter than blade, 15–40 cm long, 5–10 cm wide, simple-pinnate, glabrous or with sparse cilia along margins and along ribs beneath, leaflets ovate, sessile, strongly and irregularly toothed or pinnatifid to midrib, paler beneath; cauline leaves smaller, upper leaves sessile on expanded sheath, with obsolete blade; terminal umbel 4–7 cm across, of 20–30 rays scabrous above; involucre absent or of 5–10 nearly entire recurved short-haired leaflets scarious beneath; umbellets ca. 1.5 cm across; involucels of 7–11 linear acuminate unequal glabrous leaflets shorter than or nearly as long as umbellets; calyx-teeth triangular-lanceolate, 0.7 mm long; petals white or violet, dorsally glabrous, broadly ovate, ca. 1.5 mm long, slightly notched, with short inward tip; fruit ovoid, 4 mm long, 2 mm wide, with 5 equal winged ribs, glabrous or slightly scabrous; stylopodium conical; styles divergent or recurved, half as long as fruit. July–August.

Pine and mixed forests, felled areas, mixed herb meadows, limestone slopes.— European part: V.-Kama (Bashkiriya, Central and Southern Urals) Endemic. Described from Siberia (?). Type in London.

Economic importance. According to G.V. Pigulevskii and N.V. Nazarenko the fruits contain 1.25% essential oil, comprising a sesquiterpene, $C_{15}H_{24}$, yielding azulene upon dehydrogenation, but containing no esters or free spirits.

Note. This species was reported by Linnaeus for Siberia, but in his time Siberia was considered as covering a much larger area, including the provinces of European Russia and the Urals.

- 480 Series 3. **Condensatae** Schischk. — Stem cylindrical, styles erect or slightly divergent, more than half the length of the fruit.

9. *L. condensata* (L.) Crantz, Class. Umbell. Emend. (1767) 108, Ldb. Fl. Ross. II, 280; Turcz. Fl. baic.-dahur. I, 482; Kryl., Fl. Zap. Sib. VIII, 2070.— *L. vulgaris* var. *condensata* DC. Prodr. IV (1830) 150.— *L. arctica* Rupr. Fl. samojed. cisural. (1845) 36.— *L. fastigiata* Rupr. l. c. (1845) 36.— *Athamanta condensata* L. Sp. pl. (1753) 224.— *Seseli condensatum* Rchb. lc. Fl. Germ. XXI (1876) 37, nomen.— *Peucedanum condensatum* K.-Pol. in Spisk. rast. gerb. russk. fl. VIII (1922) 115.— Ic.: Ldb. Ic. pl. fl. ross. II, tab. 178; Rupr. Fl. samojed. cisural. tab. II.— Exs.: G. R. F. No. 1219 and No. 2626.

Perennial; stem 30–80 cm high, 1.5–3 mm thick, erect or slightly branching in upper part, faintly ribbed, glabrous; radical leaves with petioles as long as blade or longer, blade ovate-lanceolate or oblong, bipinnate, 5–15 cm long, 2–6 cm wide; leaflets sessile, 1.5–3 cm long, 1–2.5 cm wide, pinnatisect into lanceolate or oblong, acuminate, dentate 5–13 mm long, lobules, upper leaves smaller, on short, membranous, sometimes pink petioles with slightly expanding margins; petioles, sheath

and blades of leaves covered with short spreading hairs along margins and along nerves beneath. Umbels 3–7 cm across, of 20–40 short-haired rays; involucre multifoliate, of 11–21 linear-lanceolate hairy leaflets with narrow scarious margin, sometimes involucre absent; umbellets 7–10 mm across, with short-haired pedicels; involucels of 12–15 lanceolate leaflets with membranous margins, as long as or longer than umbellets; calyx-teeth subulate, pubescent, $\frac{1}{3}$ to $\frac{1}{3}$ the length of the white or pink glabrous petals; ovary and fruit covered with rather long, thin soft spreading hairs; fruit ovoid, 3–4 mm long, 2–3 mm wide, compressed dorsally (lens-shaped), dorsal ribs prominent, the lateral winged, 0.5–1 mm wide; canals absent (!); stylopodium short-conical; styles erect or slightly divergent, nearly as long as fruit. June–July. (Plate XXX, Figure 17.)

Thinned-out forests, damp meadows, shrubby thickets, often ascending in alpine zone and reaching the European part of the Arctic. – Arctic: Arct. Eur. (Kanin Peninsula); W. Siberia: Ob, Alt.; E. Siberia: all regions; Far East: Okh., Kamch.; Centr. Asia: Dzu-Tarb. Endemic. Described from Siberia. Type in London.

10. *L. dolichostyla* Schischk. sp. n. in Addenda XV, 434.

Perennial; rhizome ascending; stems few, 35–50 cm high, their base covered with dark brown fibrous leaf remnants, glabrous, hollow, cylindrical, thinly ribbed, slightly branching above; radical leaves oblong, their petioles expanding to sheath, slightly longer than blade, blade 8–10 cm long, 2.5–3.5 cm wide, bi- or nearly tripinnatisect, primary lobes 7–8 pairs, the lower remote, sessile, pinnatisect into lanceolate-linear lobules or oblong 3–6 mm long, 1–1.5(2) mm wide, mucronate segments with glabrous or obscurely scabrous margins; cauline leaves few, similar to radical but smaller, sessile on expanded sheath. Umbels 2–3 cm across at flowering, of 15–16 glabrous nearly equal rays; involucel of 5–7 long-acuminate, linear leaflets with scarious margins; umbellets ca. 6 mm across; involucels of 7–8 lanceolate-linear acuminate leaflets with scarious margins, nearly as long as umbellets; calyx-teeth linear-subulate, easily visible; petals white, glabrous, broadly ovate, notched, ca. 1.5 mm long; fruit ovoid, flattened, 4 mm long, 2 mm wide, with thin dorsal ribs; stylopodium short-conical, black; styles erect or divergent, ca. 3 mm long. July August.

Subalpine damp meadows. – Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from Tien Shan. Type in Leningrad.

Section 3. *Pseudolibanotis* Schischk. sect. nov. in Addenda XV, 436. – Main stem not developed, the root neck bearing slightly leafy, sometimes nearly leafless shoots which spread along ground or ascend.

11. *L. setifera* (Korov.) Schischk. comb. nov. – *Ligusticum setiferum* Korov. ex Pavlov in Tr. prikl. bot. ser. 1 (1937) 267, in Note.

Perennial; root vertical, to 1 cm thick, its neck covered with dark brown leaf remnants; stems many, 7–12 cm long, ascending, simple or slightly branching, slightly leafy, glabrous, hardly ribbed; radical leaves many, their petioles nearly as long as blade, blade oblong-ovate, 1.5–2.2 cm long, 0.7–0.8 cm wide, simple- (or nearly bi-) pinnate, primary lobes sessile, incised-dentate, with ovate teeth abruptly passing into setiform white to

1.5–2.0 mm long cusp; cauline leaves few or single (sometimes stem leafless), smaller, sessile on expanded sheath. Umbels 2–3 cm across, of 10–20 rays hairy above; leaflets of involucre 7–11, linear, margins or
482 entire leaflets scarious, long-acuminate, erect or partly spreading, half the length of the umbel rays; umbellets 5–7 mm across; leaflets of involucre 5, narrowly linear, nearly as long as umbel, caducous; calyx-teeth short, inconspicuous; petals white, ca. 1 mm long, with acute inward curved tip; young fruit thinly scabrous-hairy; stylopodium short-conical; styles recurved, as long as stylopodium; stigma capitate; mericarps with 5 prominent filiform ribs. July–August.

Rock crevices at 3,500 m. – Centr. Asia: T. Sh. (Talass Ala-Tau). Endemic. Described from the upper reaches of the Dzhebogly-Su River. Type in Leningrad.

12. *L. calycina* Korov. in Bot. mat. Gerb. Inst. bot. i zool. AN UzSSR, VIII (1947) 20.

Perennial; root fusiform, its neck covered with leaf remnants, branch stem not developed; the root neck bearing several weak, declinate, furrowed slightly scabrous, ca. 25 cm long flower stalks with 1–2 branches; leaves nearly all radical, with flat petioles, as long as blade, expanding at base to lanceolate sheath with membranous margins; blade ovate, bipinnatisect into short, 3 cm long lobules; all lobes sessile, the terminal elliptic, 2–3-fid, into lobules with stiff mucro, scabrous along margins and nerves; cauline leaves, if present, smaller and less dissected, sessile on lanceolate broad membranous sheaths. Umbels of 20 unequal furrowed, scabrous, 15–20 mm long rays; involucre and involucels 10-leaved, leaflets free, linear, acuminate, membranous; involucels as long as umbellets; flowers ca. 20 per umbel, pedicels scabrous; calyx-teeth lanceolate-subulate, triangular at base; petals white, glabrous, ovate, slightly notched, with acuminate inward curved tip; stylopodium flattened-conical; styles thin, long, curved, 1.3 mm long; fruit (unripe) oblong, gray from short hairs, 3.5 mm long, nearly rounded in cross section with obtuse ribs; resinous canals 3 under vallecule, 4 on dorsal side. July.

Stony slopes in subalpine zone. – Centr. Asia: T. Sh. (W.). Endemic. Described from Chimgan Range. Type in Tashkent.

Section 4. *SHULTZIOPSIS* Schischk. sect. nov. in Addenda XV, 436. – Stem erect, leafy, thick; subcapitate umbel surrounded by the rounded sheaths of terminal leaves.

483 13. *L. monstrosa* (Willd.) DC. Coll. Mém. V (1829) 48; Kryl., Fl. Zap. Sib. VIII, 2073. – *L. stephaniana* DC. Prodr. IV (1830) 151. – *Athamanta monstrosa* Willd. ex Schult. Syst. veg. VI (1820) 495. – *A. compacta* Ldb. Fl. alt. I (1829) 327. – *Schultzia compacta* Ldb. Fl. Ross. II (1844–1846) 258. – *Seseli monstrosum* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXIX (1915) 183. – Ic.: Ldb. Fl. Ross. I, tab. 81. – Exs.: G. R. F. No. 2642.

Perennial; root thick, vertical; stem erect, simple, glabrous, slightly furrowed, 20–50 cm high, 5–10 mm thick; radical and lower cauline leaves

glabrous, long-petioled, pinnate, with petioles 10–25 cm long, 4–8 cm wide; leaflets 3–4 pairs, sessile, ovate, dentate, more or less deeply pinnatifid into ovate-lanceolate obtuse lobes, rarely leaves bi- or nearly tripinnate with oblong-linear lobules (var. *laciniata* (Ldb.) Kryl.); upper leaves smaller, with short broadly expanded sheaths and spreading-hairy petioles. Umbel single, very dense, subcapitate, 4–6 cm across, covered below with broad, subrounded, hairy sheaths of terminal leaves, with membranous margins, colored along nerves, their blade slightly developed or nearly obsolete; umbel rays thickish, covered with long hairs; leaflets of involucre ovate or lanceolate, thinly acuminate, nearly as long as umbel, villous; umbellets many-flowered, 1–1.5 cm across; leaflets of involucels linear or lanceolate, dirty violet, villous, longer than umbellets; calyx-teeth triangular, with few marginal cilia; petals pale violet, ca. 1 mm long, 0.5 mm wide; fruit 3 mm long, pubescent; styles long, nearly as long as fruit. July – August.

Alpine meadows and mossy-lichen mountain tundra, rarely in subalpine meadows. — W. Siberia: Alt.; E. Siberia: Ang.-Say. Endemic. Described from Siberia. Type was in Berlin.

Genus 1024. **SESELI*** L.

L. Sp. pl. (1753) 260. — *Lomatopodium* Fisch. et Mey. in Bull. phys.-math. Acad. Pétersb. III (1845) 305. — *Seseli* subgen. *Euseseli* Drude in Engl. Pflanzenfam. III, 8 (1898) 20.

184 Calyx-teeth obtuse or acute, persistent; petals white, sometimes with violet nerves outside, rarely yellowish, notched, obcordate or ovate-cordate, with very short claw and inward curved lobe; stylopodium pulviniform or conical, rarely pyramidal-conical; styles shorter or longer than stylopodium, usually with recurved tip, rarely nearly erect with capitate stigma; fruit ovoid or oblong or oblong-cylindrical, slightly compressed laterally, glabrous or scabrous or densely hairy; mericarps with 5 thick ribs, marginal sometimes slightly expanded; valliculae rather broad and flat, usually with single, very rarely with 2–4 canals, usually 2, rarely more canals toward commissure; albumen flat toward commissure; carpophore 2-partite. Perennial, rarely biennial herbs, with repeatedly pinnatisect leaves.

Up to 80 species in Europe, the Caucasus, Asia Minor, W. Siberia and Central Asia. Members of this genus have been reported as growing in Australia, S. Africa and S. America, but these records are probably erroneous.

1. Leaflets of involucels free or fused only at base (for less than $\frac{1}{3}$) . . . 2.
- + Leaflets of involucels fused to $\frac{1}{3}$, sometimes for more than half . . . 41.
2. Involucre of 3–11 leaflets 3.
- + Involucre absent or of 1–3 leaflets, often caducous 19.
3. Terminal leaf lobes large, broadly ovate, 4.5–10 cm long, 3.5–10 cm wide. 46. *S. macrophyllum* Rgl. et Schmalh.
- + Terminal leaf lobes narrower, lanceolate, linear or subulate 4.

* From the Greek *seseli* — Hippocrates' and Dioscorides' name for species of the Umbelliferae, apparently derived from one of the Eastern languages.

4. Ovary and fruit glabrous 5
- + Ovary and fruit pubescent 7
5. Umbels of 3-10 rays; pedicels recurved in fruit 47. *S. foliosum* (Somm. et Lev.) Mand
- + Umbels of 8-20 rays; pedicels erect in fruit 6
6. Umbels of 10-20 glabrous rays, terminal leaf lobes with scabrous margins (Caucasus). 6. *S. peucedanoides* (M. B.) K.-Pol.
- + Umbels of 8-13 rays scabrous above, terminal leaf lobes with glabrous margins (European part) 7. *S. elegans* Schischk.
7. Leaflets of involucre 10-16, some 3-partite (Crimea) 11. *S. lehmannii* Degen.
- + Leaflets of involucre 5-10, always entire 8.
8. Main umbel 10-15 cm across; involucels of 25-30 linear leaflets fused at base, longer than flowering umbellets (Crimea) 10. *S. gummiferum* Pall.
- 485 + Main umbel not more than 8 cm across; involucels of 5-20, not fused leaflets, shorter than umbellets 9.
9. Terminal lobules narrowly linear, often subfiliform, 3-8 cm long, 0.2-1 mm very rarely to 3 mm wide 10.
- + Terminal lobules lanceolate-linear or lanceolate, 0.2-3 cm long, 1-7 mm wide, if narrowly linear then not more than 15 mm long. 12.
10. Umbels 5-10 flowered, pedicels as long as flowers 27. *S. tenuisectum* Rgl. et Schmalh.
- + Umbels 10-30-flowered; flowers subsessile, umbellets globular 11.
11. Stems 100-200 cm high, short-haired; leaflets of involucre 5-10, long-acuminate; leaflets of involucels 6-7, umbel rays numerous, petals glabrous outside 28. *S. iliense* (Rgl. et Schmalh.) Lipsky
- + Stems to 100 cm high, glabrous; involucre of 5-6 oblong-lanceolate obtuse leaflets; leaflets of involucels 10-12; umbels of 8 rays; petals densely hairy dorsally 29. *S. giganteum* Lipsky.
12. Umbels small, 0.8-2 cm across, leaflets of involucre ovate, 2-5; stems glabrous 13.
- + Umbels 2-7 cm across, leaflets of involucre lanceolate-linear; stems often pubescent 14.
13. Petals yellowish, umbels with subglabrous rays (Tien Shan) 30. *S. aemulans* M. Pop.
- + Petals white; umbels with densely pubescent rays 31. *S. squarrosus* Schischk.
14. Leaflets of first order clustered (whorled) 15.
- + Leaflets of first order opposite, not in fascicles 16.
15. Fruit ovoid-oblong, 3-4 mm long, ca. 1.5 mm wide (W. Tien Shan) 25. *S. fasciculatum* Korov.
- + Fruit ovoid, 5 mm long, 2.5 mm wide (Pamir-Alai) 26. *S. korovinii* Schischk.
16. Leaflets of involucels fused at base 22. *S. songoricum* Schischk.
- + Leaflets of involucels free 17.
17. Fruit oblong-elliptic, 6 mm long, 3.5 mm wide; plant 20-25 cm high (Dzungarian Ala-Tau) 21. *S. abolinii* (Korov.) Schischk.
- + Fruit oblong-ovoid, 3-4 mm long, 1.5 mm wide; plant 25-100 cm high (Pamir-Alai, Tien Shan, NW Kazakhstan) 18.

18. Terminal leaf lobules oblong-linear, 0.7–3 cm long, 2–7 mm wide (Pamir-Alai, W. Tien Shan) 23. *S. lehmannianum* (Bge.) Boiss.
- 486 + Terminal leaf lobules narrowly linear, 3–5 mm long, 1–1.5 mm wide (NW Kazakhstan) 19. *S. eriocarpum* (Schrenk) B. Fedtsch.
- 19(2) Stylopodium large, pyramidal-conical, half the length of the fruit; styles shorter than stylopodium (Centr. Asia) 20.
- + Stylopodium short-conical, much shorter than fruit; styles longer than stylopodium, very rarely shorter 22.
20. Umbel rays 2–5, extremely unequal, sometimes 1–3 umbellets subsessile 45. *S. sessiliflorum* Schrenk.
- + Umbel rays 5–10, nearly equal 21.
21. Entire plant glabrous or subglabrous; involucels of 8–9 leaflets 43. *S. coronatum* Ldb.
- + Stems, leaves, umbel rays and young fruit scabrous-hairy, involucels of 5–6 leaflets 44. *S. asperulum* (Trautv.) Schischk.
22. Ovary and fruit bear a white-scarious basal frill 8. *S. glabratum* Willd.
- + Base of ovary and fruit never with white-scarious frill 23.
23. Ovary and fruit pubescent 24.
- + Ovary and fruit glabrous 37.
24. Umbel rays 2–5(6) 25.
- + Umbel rays (5)6–80 26.
25. Umbels of 2–3 obscurely scabrous rays; pedicels of flowers nearly as long as flowers 18. *S. leptocladum* Woron.
- + Umbels of 4–5 pubescent rays; flowers sessile 24. *S. turbinatum* Korov.
26. Petals yellow or yellowish, umbel rays glabrous (Centr. Asia) 32. *S. valentinae* M. Pop.
- + Petals white or greenish, umbel rays more or less hairy above or all over 27.
27. Blade of radical and lower cauline leaves narrowly oblong, 4–8 cm long, 1–2 cm wide; primary lobes sessile or short-petioled, approximate in whorls 25. *S. fasciculatum* Korov.
- + Blade of leaves broadly obovate or triangular, 15–30 cm long, 10–20 cm wide, primary lobes on more or less long petiolules. 28.
28. Entire stem covered with short velutinous hairs 29.
- + Stem glabrous 31.
29. Terminal leaf lobules very small, 1–2 mm long; entire plant grayish from dense short hairs; umbels of 15–30 rays 20. *S. incanum* (Steph.) B. Fedtsch.
- 487 + Terminal leaf lobules 5–20 mm long, 1–2.5(3) mm wide; plant slightly pubescent, sometimes glabrous in lower part 30.
30. Main umbel 9–10 cm across, of 25–80 rays; petals dorsally hairy; fruit 2 mm long, ca. 1 mm wide 9. *S. petraeum* M. B.
- + Main umbel 5–6.5 cm across, of 15–25 rays; petals dorsally glabrous; fruit 5–5.5 mm long, 2.5 mm wide 12. *S. ponticum* Lipsky.
31. Petals greenish, dorsally pubescent; stem 2–3 m high (Centr. Asia) 22. *S. giganteum* Lipsky.
- + Petals white, dorsally glabrous; stem not exceeding 1.5 m (S. European part of USSR, Caucasus) 32.

32. Stem 100–140 cm high, ca. 1.5 cm across; blade of radical leaves 25–30 cm long, 20 cm wide (Artvin) 17. *S. andronakii* G. Woron.
 + Stem 20–100 cm high, 0.5–1 cm across; blade of radical leaves 10–20 cm long, 8–12 cm wide 33.
33. Umbel rays densely pubescent all over. 34.
 + Umbel rays pubescent only above 35.
34. Umbel rays 7–12, umbels 1.5–2.5 cm across 16. *S. peucedanifolium* (Spreng.) Bess.
 + Umbel rays 16–26, umbels 4–6 cm across . . . 37. *S. rupicola* Woron.
35. Fruit large, 5.5–6 mm long, ca. 2 cm wide, dorsal ribs nearly winged 15. *S. arenarium* M. B.
 + Fruit 3–3.5 mm long, ca. 1.5 mm wide, dorsal ribs not winged . . 36.
36. Umbels of 5–8 rays, umbellets small, 3–7 mm across (Crim.) 14. *S. pauciradiatum* Schischk.
 + Umbels of 7–15 rays, umbellets 5–8 mm across 13. *S. campestre* Bess.
- 37(23) Involucels of narrowly lanceolate leaflets with scarious margins exceeding pedicels and often entire umbellet; biennials 2. *S. annum* L.
 + Leaflets of involucels without broad scarious margin, much shorter than pedicels; perennials 38.
38. Leaflets of involucels setiform, terminal leaf lobules 2–5 cm long; 488 branches and leaves more or less appressed to stem 1. *S. strictum* Ldb.
 + Leaflets of involucels lanceolate-subulate or ovate, terminal leaf lobules 0.5–2 cm long; branches and leaves more or less spreading 39.
39. Umbel of 10–15 angular rays; fruit slightly tuberculate (Ukraine) 5. *S. pallasii* Bess.
 + Umbels of 15–25 subcylindrical rays; fruit smooth (Crimea and Caucasus) 40.
40. Fruiting umbels compressed, canals under valleculae large, cylindrical-inflated, occupying entire space between ribs 4. *S. grandivittatum* (Somm. et Lev.) Schischk.
 + Umbels procumbent in fruit, canals under valleculae narrow 3. *S. varium* Trev.
- 41(1) Umbel rays 20–35; stem glabrous below covered with short soft hairs above (Abkhazia) 37. *S. rupicola* Woron.
 + Umbel rays 2–20 42.
42. Terminal leaf lobules wide, 1.5–5(10) cm 43.
 + Terminal leaf lobes not wider than 0.5 cm, usually narrower . . . 45.
43. Umbel rays 4–7 (Caucasus) 39. *S. cuneifolium* M. B.
 + Umbel rays 2–4(6) (Centr. Asia) 44.
44. Petals densely hairy dorsally; fruit ovoid, 5 mm long (Lake Bal-khash area) 41. *S. platyphyllum* (Schrenk) O. et B. Fedtsch.
 + Petals dorsally glabrous or with sparse hairs; fruit oblong, 7 mm long (Kara-Kum and Lesser Balkhan) . . . 40. *S. jomuticum* Schischk.
45. Umbels of 2–5(6) glabrous rays; umbellets dense, very small, 2–3 mm across (Dagestan) 35. *S. alexeenkoi* Lipsky.
 + Umbels of 5–20 more or less pubescent rays; umbellets 8–10 mm across 46.

46. Fruit oblong, 6 mm long, 2 mm wide 42. *S. eriocephalum* (Pall.) Schischk.
 + Fruit ovoid, 2–3.5 mm long 47.
 47. Umbel rays 5–9, densely pubescent; umbellets subglobular, 1–2 cm
 across 48.
 + Umbel rays 10–20, slightly pubescent above; umbellets 3 cm
 across 49.
 48. Leaf lobules of the last order narrowly linear, 1–2 cm long, ca.
 0.5 mm wide; cauline leaves appressed to stem; fruit 2.5 mm long,
 1.5 mm wide; styles several times as long as stylopodium (Crimea)
 36. *S. dichotomum* Pall.
 + Leaf lobes of the last order lanceolate, 5–7 mm long, 0.5–2 mm wide;
 cauline leaves spreading; fruit 3.5 mm long; styles slightly longer
 489 than stylopodium (Centr. Asia) 38. *S. karatavicum* Schischk.
 49. Ovary more or less pubescent, fruit subglabrous (W. European part
 of USSR) 33. *S. hippomarathrum* Jacq.
 + Fruit densely pubescent (E. European part of USSR, W. Siberia and
 N. Centr. Asia) 34. *S. ledebourii* G. Don.

Section 1. *EUSESELI* DC. Coll. Mém. V (1828) 47 emend. Calestani in Webbia, I (1905) 199. — Section *Hippomarathroides* DC. l. c. incl. — Calyx persistent, with triangular teeth; petals white or greenish, dorsally glabrous or pubescent; fruit with thickish ribs, glabrous or pubescent, vallecule with 1 canal.

Series 1. *Stricta* Schischk. — Umbels of 15–35 rays; fruit glabrous; styles longer than stylopodium; leaves tripinnatisect, with linear or linear-lanceolate lobules of the last order.

1. *S. strictum* Ldb. Fl. alt. I (1829) 338; Fl. Ross. II, 275; Shmal'g., Fl. I, 398; Kryl., Fl. Zap. Sib. VIII, 2065. — *Athamanta stricta* Ldb. ex Steud. Nomencl. ed. 2, I (1840) 166. — *Pseudommi ehrenbergii* Wolff in Fedde, Repert. spec. nov. XVII (1921) 173; Wolff in Engl. Pflanzenr. IV, 228 (1927) 124. — Ic.: Ldb. Ic. pl. Fl. Ross. II, tab. 174.

Perennial; root vertical or ascending, 4–7 mm thick; stem 12–70 cm high, erect, usually with few obliquely antrorse branches, ribbed above, like leaves glabrous; radical leaves on 5–15 cm long petioles gradually expanding to sheath, their blade broadly ovate, 5–8 cm long, 4–7 cm wide, tripinnatisect into narrowly linear acute lobes, 2–5 cm long, 0.5–1(2) mm wide; cauline leaves rather numerous, antrorse or nearly appressed to stem, on shorter petioles, with bipinnate blade; uppermost leaves smaller, less compound, on short expanding petioles. Umbels 5–9 cm across, sometimes forming corymbiform inflorescence, of 15–35 ribbed glabrous rays; involucre absent; umbellets 0.7–1.5 cm across, of 20–30 glabrous rays; involucels of many linear-filiform acute leaflets slightly shorter than pedicels; calyx-teeth triangular, acute, $\frac{1}{4}$ to $\frac{1}{5}$ the length of the petals, petals white, light violet when young, with inward curved tip, 1–1.25 mm long, nearly as wide; fruit oblong, 3–4 mm long, 1–1.5 mm wide, glabrous, with 3 prominent ribs; styles recurved, nearly half the length of the conical stylopodium. July – August.

490 Meadows, often solonchic, shrubby thickets, rarely inundated meadows, sink-holes. — European part: Transv.; W. Siberia; Alt., Irt.; Centr. Asia: Ar.-Casp. Endemic. Described from Altai (Sogra, Loktevsk, Zmiev). Type in Leningrad.

2. *S. annuum* L. Sp. pl. (1753) 260; Shmal'g., Fl. I, 398. — *S. elatum* L. Sp. pl. (1762) 375, p. p. — *S. bienne* Crantz, Stirp. Austr. ed. 1, fasc. 3 (1767) 88. — *S. purpureum* Gilib. Fl. lithuan. II (1782) 35. — *S. coloratum* Ehrh. Beitr. V (1790) 179; DC. Prodr. IV, 147; Ldb. Fl. Ross. II, 277. — *S. simplex* Poir. Encycl. VII (1806) 137. — *S. brevicaulis* Jord. in F. Schultz, Arch. Fl. I (1842–1854) 1. — *Carum simplex* Steph. ex Willd. Sp. pl. I (1788) 1470. — *Selinum dimidiatum* DC. Fl. Fr. IV (1805) 323. — *S. coloratum* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 106. — *Peucedanum flexuosum* Kit. ex Rochel, Pl. Banat. rar. (1828) 26, nomen, non Moench (1794). — Ic.: Syreishch., Illyustr. Fl. Mosk. gub. II, 406. — Exs.: G. R. F. No. 463 and No. 2640.

Biennial, perennial, rarely annual; root fusiformly thickened; neck covered with fibrous brown leaf remnants; stem 20–80 cm high, single, erect, thinly furrowed, glabrous, simple or with short antrorse branches, with leaves uniformly spaced; oblong-ovate, green, tripinnatisect; lobules linear or linear-lanceolate, 1–1.5 cm long, 0.5–1 mm wide, abruptly acuminate, with margins rolled downwards, margin and midrib densely covered with short hairs, petioles expanding to sheath; median cauline leaves smaller and less dissected, sessile on expanded sheath, upper leaves simple-pinnate. Umbels of 15–30 irregular, ribbed rays hairy above, compressed in fruit; involucre absent or of 1 leaf; umbels with numerous short-pedicelled flowers; involucels of numerous lanceolate or linear-lanceolate leaflets with scarious margin, usually longer than, sometimes twice as long as pedicels; calyx-teeth short, subulate; petals white or reddish, 0.75 mm long, broadly ovate, with inward curved attenuate tip; stylopodium short-conical; styles recurved, several times as long as stylopodium; fruit oval, 1.5–2.5 mm long, 1–1.5 mm wide, with acute whitish ribs and brown valliculae, obscurely pubescent when young, becoming glabrous. Fl. end of July, August, Fr. September.

Forest edges, shrubs, light oak forests, pine forests, grass-herb cover meadow steppes, dry and sandy slopes, sometimes edges of fields. — European part: Balt. (Vilnius), U. Dnp., U. V., M. D., V.-Don, V.-Kama (W.), Transv., L. Don (N.), Bl., Bes., U. Dns. Gen. distr.: Centr. Eur., W. Med., Bal.-As. Min. (Balkans). Described from S. Europe. Type in London.

Series 2. *Varia* Schischk. — Umbels of 7–20 rays; fruit glabrous; styles longer than stylopodium.

3. *S. varium* Trev. in Ind. sem. Horti Vratisl. (1818) 6; Horti botan. Vratislav. pl. vel novarum vel minus cognit. manip. (1824) 168; Nov. Acta nat. cur. V, 13 (1826) 168; Ldb. Fl. Ross. II, 275. — *S. decipiens* Ldb. ex Rchb. Fl. germ. excurs. (1832) 467. — ? *S. tauricum* Link ex Spreng. Syst. I (1825) 884.

Biennial or perennial; root branching, whitish; stem 60–80 cm high, erect, cylindrical, smooth, thinly ribbed, slightly thickened at nodes, branching; radical leaves numerous, ovate, ca. 3.5 cm long, 1.5 cm wide, many times pinnatisect into flat linear, 5–15 mm long, 0.5–1.5 mm wide, acute lobules; cauline leaves few, less deeply dissected, on short petioles expanding in sheath. Umbels terminating stem and branches, 2–6 cm across, of 12–20 irregular smooth rays; involucre absent or of few linear-lanceolate leaflets; umbellets many-flowered, 3–5 mm across; pedicels glabrous, 2–3 times as long as flowers; involucels of 9–10 narrowly lanceolate long-acuminate leaflets half the length of the pedicels; calyx-teeth inconspicuous; petals white, glabrous; stylopodium conical; styles recurved, longer than stylopodium; fruit ovoid, 3 mm long, 1.5 mm wide, smooth, with 3 prominent acute white ribs and dark valleculeae. Fl. July, Fr. August.

Exposed slopes, stony steppes. — European part: Crim.; Caucasus: Cisc., Dag. Endemic. Described from the Caucasus, after Blume's specimen. Type unknown.

4. *S. grandivittatum* (Somm. et Lev.) Schischk. in Izv. Kavkazsk. muz. XI (1918) 302; Grossg., Fl. Kavk. III, 167. — *S. varium* var. *grandivittatum* Somm. et Lev. in Tr. Bot. Sada, XVI (1900) 186. — Ic.: Schischk., Ibid. (fruit).

Perennial; entire plant glabrous, glaucous; root fusiform, its neck densely covered with fibrous remnants of petioles; stem 60–100 cm high, cylindrical, erect, branching; radical leaves numerous, dense, oblong-triangular, tripinnatisect into narrowly linear, 5–15 mm long, 0.5–1 mm 492 wide lobules; upper leaves few, smaller. Umbels of 8–20 thin cylindrical glabrous very unequal rays compact in fruit; involucre absent or of 1–2 leaflets; involucels of 7–9 ovate-lanceolate acuminate leaflets with scarious margins, $\frac{1}{2}$ to $\frac{1}{4}$ the length of the umbel rays; calyx-teeth very short; petals white; fruit glabrous, ovoid-oblong, 2.5–3.5 mm long, ribs prominent, regular; canals under valleculeae single, cylindrical-inflated, entirely occupying space between ribs. June.

Stony slopes. — Caucasus: E. Transc. Endemic. Described from near Tbilisi. Type in Florence, cotype in Tbilisi.

5. *S. pallasii* Bess. Ind. Horti Crem. (1816) 130; DC. Prodr. IV, 147; Ldb. Fl. Ross. II, 275. — *S. glaucum* M. B. Fl. taur.-cauc. I, 234, non L.; Shmal'g., Fl. I, 398, exp. — *S. varium* Ldb. Fl. Ross. II, 275, non Trev. — *S. osseum* Savul. et Rayss, Mater. pentru Fl. Basarab. III-A (1934) 213, non Crantz. — Ic.: DC. Coll. Mém. V, tab. 3 (fruit); Rchb. Icon. Fl. germ. XXI, tab. 1905. — Exs.: G. R. F. No. 1475.

Biennial or perennial; root fusiform, whitish, its neck covered with fibrous remnants of petioles; stem 30–120 cm high, erect, cylindrical, thinly ribbed, like entire plant glabrous, strongly branching, more or less leafy below, nearly leafless above; lower cauline leaves triangular, 2–4-pinnatisect into linear-lanceolate or linear, 1.5–2 cm long, 1 mm wide, acute or obtuse, lobules with short mucro, slightly tapering at base with hardly scarious margins; upper leaves with 3-partite or simple (linear) blade sessile on narrow sheath with white-scarious margins. Umbels of



PLATE XXXII. 1—*Seseli iliense* (Rgl. et Schmalh.) Lipsky.; 2—*S. sessiliflorum* Schrenk.; 3—*S. incanum* (Steph.) B. Fedtsch.

- 7–15 faceted glabrous rays; involucre absent or 1-leaved; leaflets of involuclers subulate with narrow white-scarious margin, shorter than pedicels; calyx-teeth conspicuous, subulate; petals small, 0.5 mm long, broadly ovate, slightly notched, with inward curved tip; stylopodium short-conical; styles longer than stylopodium, recurved; fruit broadly ovoid, with prominent ribs, 3–5 mm long, 1.5–2 mm thick, scabrous-hairy when young, becoming glabrous when ripe, indistinctly tuberculate; canals under valliculae rather large, single, 2 toward commissure. July–August.
- 495 Stony slopes. European part: Bes., Bl., U. Dns., U. Dnp., Balt. (Vilnius, introduced). **Gen. distr.:** Bal. Described from Russia. Type and cotype in Leningrad.

Series 3. *Peucedanoidea* Schischk. — Leaflets of involucre setiform; petals greenish-yellowish; fruit oblong, glabrous.

6. *S. peucedanoides* (M. B.) K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXIX (1915) 183; Hayek in Fedde, Repert. Beih. XXX, 1 (1927) 1009; Grossg., Fl. Kavk. III, 166. — *Bunium peucedanoides* M. B. Fl. taur.-cauc. I (1808) 211; III, 208; DC. Prodr. IV, 116. — *Sium peucedanoides* Spreng. Umbell. Spec. (1818) 92; Schult. Syst. veg. VI (1820) 540. — *Silaus carvifolius* C. A. M. Verzeichn. Pfl. Cauc. (1831) 125; Ldb. Fl. Ross. II, 288. — *S. peucedanoides* Boiss. Fl. or. II (1872) 974, non DC. (1830); Shmal'g., Fl. I, 400. — Exs.: G. R. F. No. 121.

Perennial; neck sparsely covered with fibrous remnants of petioles; stem glabrous, 40–80 cm high, erect, faceted-furrowed, hollow, with few antrorse branches in upper part; leaves oblong, the radical and lower cauline leaves long-petioled, bipinnatisect into oblong-linear, 4–8 mm long, ca. 1 mm wide, mucronate lobules, scabrous at margin, upper leaves smaller and less dissected, sessile on narrowly oblong sheath. Umbels of 10–20 irregular glabrous rays upright in fruit; involucre of 6–8 linear leaflets 1 cm long; involuclers of 6–8 linear-filiform acuminate leaflets; petals with incurved tip, slightly notched, yellowish-greenish; fruit oblong, 3 mm long. June–July.

Shrubs, oak forests, forest edges, meadows. — Caucasus: Cisc., Dag., E. and S. Transc. **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from near Narzan and Beshtau Mountain. Type in Leningrad.

7. *S. elegans* Schischk. in Bot. Mat. Gerb. Bot. Inst. AN SSSR, XIII (1950) 161. — *Gasparrinia peucedanoides* Woron. in Fl. Yugo-Vost. Evrop. ch. SSSR, V (1931) 808, non Thell.

Perennial; root rather thick, ascending; neck covered with few brown fibrous leaf remnants; stem faceted-furrowed, ca. 90 cm high, slightly branching in upper half with antrorse branches, together with leaves glabrous; radical leaves oblong, on petioles several times exceeding blade, the last 5–7 cm long, ca. 3 cm wide, tripinnatisect, primary lobes more or less long-petioluled, secondary lobes short-petioluled, these dissected into linear lobules 3–6 mm long, 0.5–1 mm wide, with revolute margins and mucro at apex; cauline leaves similar to the radical but on much shorter petioles; uppermost leaves sessile, simple-pinnate, small. Umbels 5–6 cm

across, of 8–13 extremely irregular rays scabrous above; involucre of 5–11 linear acuminate leaflets appressed to umbel rays; umbellets 20-flowered, 5–7 mm across; pedicels subglabrous; calyx-teeth inconspicuous; petals obcordate, notched, greenish-yellow, ca. 0.5 mm long; stylopodium short-conical; styles reflexed, nearly as long as stylopodium; ripe fruit unknown. July.

Dry slopes, shrubby formations. — European part: L. Don(NE). Endemic. Described from Danilovka (formerly Petrovsk County). Type in Leningrad.

Series 4. **Glabrata** Schischk. — A whitish frill at base of ovary and fruit.

8. **S. glabratum** Willd. ex Schult. Syst. VI (1820) 406. — **S. tenuifolium** Ldb. Fl. alt. I (1829) 333; Fl. Ross. II, 274; Kryl., Fl. Zap. Sib. VIII, 2066. — **Trinia ramosissima** Kar. et Kir. in Bull. Soc. Nat. Mosc. X (1841) 60, quo ad plant. e Buchtarma. — Ic.: Ldb. Ic. Pl. Fl. Ross. I, tab. 97. — Exs.: P. Smirn. Exs. Soc. Nat. cur. Mosq. No. 58.

Perennial; root thick, woody; stems numerous 25–40 cm high, becoming woody at base, slightly curved, thin, branching, glabrous, glaucous-green; radical leaves numerous, bipinnate, into filiform-linear, 1.5–6(8) cm long, 7.5–0.75 mm wide, glabrous lobules; cauline leaves 3–4, their short petioles dilated into sheath; upper leaves simple-pinnate or ternate or simple. Umbels 2–4 cm across, of 6–8 thickish ribbed glabrous rays; involucre absent; umbellets 5–10 mm across, 8–10-flowered; involucels of 7–8 lanceolate recurved leaflets with scarious margins, much shorter than umbellet rays; at base of ovary (and of fruit) a whitish scarious frill; calyx-teeth distinct; petals white, glabrous outside; fruit 3–4 mm long, ribs thickish, protruding; stylopodium large, pyramidal-conical; styles reflexed, shorter than stylopodium. June–July.

Feather-grass-sheep's fescue and clayey-pebbly, often solonetzic steppes, stony slopes, chalky outcrops. — European part: V.-Kama (SW-Ichki Mountain), Transv.; W. Siberia; U. Tob., Irtysh, Alt.; Centr. Asia: Ar.-Casp., 497 Balkh., Dzu-Tarb. (Saur, Tarbagatai). **Gen. distr.:** Sinkiang (along the Black Irtysh). Described from Pallas' collections from Siberia. Type in Leningrad.

Note. The plant reported from Bukhtarma by Karelin and Kirillov (Enumer. plant. altaic.) as "**Trinia ramosissima**" belongs to the highly typical **S. glabratum**, easily distinguished from all other species of **Seseli** by the frill surrounding the base of the ovary and fruit.

Series 5. **Petraea** Schischk. — Plant with thick root, main umbel of 15–80 rays; ovary and fruit short-haired.

9. **S. petraeum** M. B. Fl. taur.-cauc. I (1808) 235; Ldb. Fl. Ross. II, 276; Boiss. Fl. or. II, 364; Shmal'g., Fl. I, 399; Grossg., Fl. Kavk. III, 166. — **S. floribundum** Somm. et Lev. Nuovo Giorn. bot. ital. (1895) 75; Tr. Bot. Sada, XVI (1900) 184; Grossg., Fl. Kavk. III, 166. — Ic.: Rchb. Hort. bot. tab. 3 (1824).

Perennial; root thick, 1–2 cm across, its neck covered with fibrous leaf remnants; stems single or few 5–6 mm thick, cylindrical, furrowed, branching from base, densely short-haired, main stem usually reduced,

5–7 cm (rarely to 40 cm) high, the lateral branches sometimes 2–3 times as high; radical leaves ovate-triangular or ovate, their petioles dilated into sheath, their blade 15–20 cm long, bi- or tripinnatisect, glabrous, the primary lobes on more or less long petiolules, the lobules acute, lanceolate or narrowly ovate, rarely linear, 0.5–2 cm long, 3.5 mm wide, with flat or revolute margin; central umbel 9–10 cm across, of 25–80 densely hairy ribbed rays, lateral umbels 3–7 cm across, of 17–25 rays; involucre absent; umbellets many-flowered, 1 cm across; pedicels 2–3 times as long as flowers, densely hairy, thickening in fruit; involucels of 10–12 linear-subulate, densely hairy leaflets, usually as long as or slightly longer than pedicels; calyx-teeth lanceolate-triangular; petals white, dorsally pubescent; fruit ovoid, densely hairy, 2 mm long, ca. 1 mm wide, with filiform ribs; stylopodium conical; styles reflexed, twice as long as stylopodium. July–August.

Stony mountain slopes and cliffs, especially limestones, to 1,500 m.—Caucasus: Cisc., W. Transc. Endemic. Described from the Caucasus. Type in Leningrad.

10. *S. gummiferum* Pall. in Tab. Taur. (1797) 49, nom. nud. non *Bubon gummifer* L. Sp. pl. (1753) 254; descriptio apud Smith, Exotic Botany, II (1805) 120; DC. Prodr. IV, 145; Ldb. Fl. Ross. II, 273; Boiss. Fl. or. II, 961; Shmal'g., Fl. I, 397.—Ic.: Smith, l. c. tab. 120.—Exs.: G. R. F. No. 2040 (sub *Seseli lehmanni*); Dorfl. Herb. normale, No. 3413.

Perennial; root thick, to 2 cm across; stem 60–100 cm high, branching, ribbed, leafy, finely pubescent, the lower 10 cm covered with brown truncate remnants of petioles and sheaths, not separating into fibers; leaves tripinnatisect, oblong, glaucous, short-haired, lobules oblong or cuneate, 1.5–3 cm long, 1.5–4 mm wide, acute, decurrent. Main umbel large, 10–15 cm across, of many (30–60) densely hairy rays, umbels on lateral branches smaller, of 8–30 rays; involucre of main umbel of 8–10 lanceolate-linear acute leaflets, of smaller umbels 1–2-leaved (?) or absent; umbellets with numerous subsessile flowers; involucels of 25–30 short-haired linear acute leaflets (exceeding flowering umbellet) fused at base; petals red or white, with long-attenuate inward curved tip, glabrous outside; fruit ovoid-oblong, 4 mm long, 1.5 mm wide, very short-hairy-scabrous, with prominent obtuse, whitish ribs; stylopodium short-conical; styles reflexed, longer than stylopodium. July–August.

Rock crevices, limestones. — European part: Crim. (southern shore). Endemic. Described from the Crimea. Type in London.

Note. The flowers have a faint aroma reminiscent of barberry. When bruised, the stems yield large quantities of gum, hence the specific epithet.

11. *S. lehmannii* Degen in Bot. Zeitschr. XLVIII, No. 4 (1898) 121.—Exs.: G. R. F. No. 2641.

Perennial; root thick, 10–20 mm across; stems 10–75 cm high, single or few, leafy, glabrous, branching or simple; leaves oblong, glabrous, bipinnatisect into linear, 2.5–7 cm long, 1–2 mm wide lobules, their petioles nearly as long or $\frac{1}{2}$ to $\frac{1}{3}$ the length of the blade, dilated into sheath; median and upper leaves less dissected, short-petioled. Main umbel of

30 rays 7–9 cm across, lateral umbels of 12–20 unequal rays hairy above 3.5–5 cm across; involucre of 10–16 linear-lanceolate, acuminate leaflets with scabrous hairy margins, sometimes 3-partite above, half as long as 499 rays; umbellets many-flowered, 0.5–2 cm across, semiglobular, the flowers densely crowded, nearly sessile; leaflets of involucels narrowly lanceolate, acuminate, slightly spinose, hairy dorsally and along margins, as long as or longer than umbellets; calyx-teeth triangular, acute, persistent; petals white or pink, ovate; stylopodium conical, with pectinate margin; styles elongating in fruit, reflexed, purple; fruit obovoid, short-haired, ca. 4 mm long, prominently ribbed. July–August.

Stony slopes in upper parts of Crimean mountain pastures. — European part: Crim. (Ai-Petri, Roman-Kosh, Chernaya, Babugan and other mountains). Endemic. Described from the summit of Ai-Petri. Type in Budapest.

12. *S. ponticum* Lipsky in Tr. Bot. Sada, XIV (1897) 269; Grossg., Fl. Kavk. III, 160. — Exs.: Herb. Fl. Cauc. No. 437; Fl. cauc. exs. No. 366.

Perennial; plant glaucous, stem 20–70 cm high, more or less velutinous-hairy, branching above; radical leaves numerous, glabrous, oblong, short-petioled, tripinnatisect into linear or narrowly linear, 0.5–2.5 cm long, 1–2 mm wide lobules; median and upper leaves smaller and less dissected, sessile on dilated sheath, the uppermost leaves bipinnatisect, often hairy. Main umbel 5–6.5 cm across, of 15–25 rays, lateral umbels smaller, 1–4 cm across, of 8–13 unequal, ribbed, densely haired rays; involucre absent or of few leaflets; umbellets 10–12-flowered, 10 mm across; leaflets of involucels lanceolate, as long as umbellet, acute, fused at base; calyx-teeth triangular, persistent in fruit; petals white, dorsally glabrous, with inward curved tip; fruit 5–5.5 mm long, 2.5 mm wide, hairy, with 3 prominent ribs. July–August.

Limestone and clayey slopes, near cliffs. — Caucasus: W. Transc. (Anapa, Novorossiisk, Gelendzhik, and others). Endemic. Described from Anapa, Novorossiisk and others. Type in Leningrad.

Series 6. *Tortuosa* Schischk. — Stems strongly branching from base or middle; umbels of 2–15 rays; flowers and fruit hairy; involucre usually absent.

13. *S. campestre* Bess. Enum. pl. Volhyn. (1822) 47; Trevir. in Act. Soc. cur. Nat. 13 (1826) 170; DC. Prodr. IV, 148; Ldb. Fl. Ross. II, 275. — *S. tortuosum* Boiss. Fl. or. II, 964, ex p. non L.; Grossg., Fl. Kavk. III, 166, ex p. — *S. tortuosum* β . *campestre* Schmalh., Fl. Sredn. i Yuzhn. Rossii, I (1895) 399; Savulescu et Rayss, Materiale pentru 500 Flora Basarabici, III-A (1934) 213. — ? *S. devenyense* Grossh., Fl. Kavk. III, 167, non Sim.

Perennial; root 0.5–1.5 cm thick, usually erect, its neck nearly without fibrous leaf remnants; stem 50–100 cm high, finely ribbed, usually branching from base with numerous hollow, nearly horizontal, antrorse branches, stem and leaves glabrous, shiny, pale green or more or less deep violet;

radical leaves numerous, their petioles canaliculate gradually dilating into rather long, narrowly oblong sheath, their blade obtriangular, 15–25 cm long, nearly as wide above, 3–4-pinnatisect, primary lobes on petiolules, the lower primary pair obliquely ascending, nearly as long as entire leaf, lobules linear, 0.5–2 cm long, 0.5–1.5 mm wide, acute, with slightly revolute margins; upper cauline leaves smaller, less deeply dissected, uppermost leaves reduced to sheath. Umbels 3–5 cm across, numerous, terminating stem and branches (size of terminal umbel differs very little from the lateral), of 7–15 angular, unequal rays scabrous-hairy above; involucre absent or 1 of 1–2 upright lanceolate-acuminate leaflets; umbellets 5–8 mm across, with short-scabrous rays; involucels of 9–12 upright lanceolate-linear, acuminate, scabrous-hairy leaflets with narrow scarious margins, as long as umbellet; ovary densely hairy; stylopodium conical, with undulant base; styles reflexed, $1\frac{1}{2}$ to 2 times as long as stylopodium; fruit ovoid, densely hairy, 3 mm long, 1–2 mm wide, with thickish ribs. July–August.

Chernozem and stony steppes, stony slopes, chalk outcrops, rarely as a weed of fields. — European part: M.D., Bl., U.Dns., Bes., L. Don, L. V., Transv.; Caucasus: Cisc., Dag., E. Transc. Gen. distr.: Bal.-As. Min. Described from Podolia. Type and cotype in Leningrad.

14. *S. pauciradiatum* Schischk. sp. nov. in Addenda XV, 436. — *S. tortuosum* Ldb. Fl. Ross. II, 276, quoad pl. taur.; Boiss. Fl. or. II, 964, quoad pl. taur.; Grossg., Fl. Kavk. III, 166, p. min. p. — *S. tortuosum* β . *tauricum* DC. Prodr. IV (1830) 148, non *S. tauricum* Link.

501 Perennial; root ascending, 8 mm thick, its neck densely covered with fibrous leaf remnants; stems single, 20–40 cm high, 3–4 mm thick, more or less flexuose, glabrous, finely ribbed, branching from base; radical leaves numerous, ovate, 11–15 cm long, 5–10 cm wide, tripinnatisect, their petioles dilated into sheath; lobules 0.3–2 cm long, 0.5–1 mm wide, acute, slightly scabrous along margins and midrib; cauline leaves smaller, less finely dissected; uppermost leaves reduced to sheaths. Umbels 1–3 cm across, of 5–8 thickish, ribbed rays hardly scabrous above; involucre absent; umbellets many-flowered, dense, subglobular, 3–4 mm across; involucels of 7 lanceolate-linear acuminate leaflets with scarious margin, nearly as long as umbellet; pedicels glabrous, as long as or twice as long as flowers; calyx-teeth inconspicuous; ovary densely covered with short hairs; stylopodium short-conical; styles reflexed; fruit ovoid, 2.5 mm long, ca. 1.5 mm wide, stiff-haired, with prominent nerves. Fl. August–September, Fr. October.

Clayey slopes. — European part: Crim. (Karadag Mountain, Greater Agarmysh plateau, Kholodnaya ravine, Soudag and Shapka Monomakha mountains); Caucasus: W. Transc. (Novorossiisk, Gelendzhik, Anapa). Endemic. Described from the Crimea. Type in Leningrad.

15. *S. arenarium* M. B. Fl. taur. - cauc. III (1819) 242, in adnot. — *S. annum* Pall. Tab Taur. 49, non L.; M. B. Fl. taur. - cauc. I, 235, non L. — *S. tortuosum* Trev. in Mag. Nat. Berl. VII (1818) 148, non L.

Perennial; root 6–12 mm thick; stem 40–150 cm high, glabrous, finely ribbed, flexuose, glaucescent green, sometimes slightly violet, branching

from base with strongly spreading branches; leaves ovate-triangular, the radical to 20–25 cm long, 10–12 cm wide, the short petioles gradually dilating to sheath, tripinnatisect into linear, 10–45 mm long, 0.5–1 mm wide lobules with slightly revolute margins; upper leaves smaller. Umbels 3–6 cm across, of 6–15 unequal, ribbed rays hairy above, very rarely glabrous; involucre of 1–2 linear or lanceolate leaflets or absent; umbellets many-flowered; pedicels hairy, very rarely glabrous, 2 to 3 times as long as flowers; involucels of 5–10 linear acuminate leaflets with scarious margin, usually short-haired outside; petals white, hairy outside; fruit ovoid, with sparse stiff hairs, 5.5 mm long, 2.5 mm wide, with 3 prominent ribs. July–September.

Feather-grass steppes, stony and chalk slopes, pine forests, rarely a weed of crops. — European part: Bl., L. V., U. Dnp., U. Dns., L. Don, V.-Don, Transv., Crim. (Kerch, Karadag Mountain, elsewhere rare); 502 Caucasus: Cisc. Endemic. Described from the Ukraine. Type in Leningrad.

16. *S. peucedanifolium* (Spreng.) Bess. Enum. pl. Volhyn. (1822) 44; Trevir. Act. Soc. cur. Nat. V, 13 (1826) 172, in adnot.; DC. Prodr. IV, 145, non Merat, Fl. Paris. (1832) 115. — *S. rigidum* β . *peucedanifolium* Bess. in Flora (1832) II, Beibl. 27; Ldb. Fl. Ross. II, 274. — *S. leucospermum* subsp. *peucedanifolium* Nyman, Consp. Fl. Eur. (1878) 295. — *Bubon peucedanifolius* Spreng. Syst. I (1819) 900. — *B. rigidus* γ . *peucedanifolius* Spreng. in Schult. Syst. veg. VI (1820) 497.

Perennial; root vertical or ascending, 4–6 mm thick; stems usually single, 40–60 cm high, 4–5 mm thick, glabrous, finely ribbed, with obliquely antrorse branches from middle up; radical leaves numerous, 1.5–5 cm long, 0.5–1.5(2) mm wide, glabrous, thinly acuminate, tripinnatisect into long lobules; cauline leaves smaller, less strongly dissected. Umbels 1.5–2.5 cm across, of 7–12 angular, densely hairy, unequal rays; involucre absent; umbellets many-flowered, 4–6 mm across; pedicels hairy, shorter than flowers or as long; involucels of 8–11 lanceolate or linear-lanceolate acuminate, more or less hairy leaflets connate at base, nearly as long as umbellet or longer; fruit oblong-ovoid, tuberculate-hairy when young. July–August?

Slopes. — European part: U. Dns. (Podolia). Endemic. Described from the southern Ukraine. Type in Kiev, cotype in Leningrad.

17. *S. andronakii* Woron. in Addenda XV, 437.

Perennial; root vertical, ca. 10 mm across, its neck covered with brown leaf remnants; stem single, 40–140 cm high, to 1.5 cm across, erect, dense, glabrous, flexuose, thinly furrowed, branching from middle; radical leaves numerous, glaucescent, their short petioles dilated to sheath, their blade broadly obovate, 25–30 cm long, ca. 20 cm wide, many times pinnatisect, into 1–3 cm long, 0.5–1 mm wide, linear or narrowly linear acute lobules with revolute margins; cauline leaves smaller and less dissected, subsessile or on short expanded petioles. Umbels numerous, 2–4.5 cm across, of 5–8 unequal ribbed rays scabrous above; involucre absent; umbellets 4–6 mm across, with numerous densely crowded flowers on short-haired

503 pedicels as long as flowers or longer; involuclers of 10–11 ciliate leaflets with scarious margins, nearly as long as umbellet; calyx-teeth inconspicuous; petals white, dorsally glabrous, ca. 1 mm long; ovary densely covered with white-hairs; stylopodium flat-conical; fruit unknown. August.

Stony slopes. — As yet this species has not been observed in the USSR but it occurs in the region close to Turkey (Artvin District, near Lomashen and Olta). Endemic. Described from Artvin District. Type in Leningrad.

18. *S. leptocladum* Woron. in Tr. Bot. Inst. AN SSSR, ser. 1, Fl. i sist. I (1933) 219. — *S. sedae* Takht. in Adnot. ad indic. sem. a horto botan. Erevanensi (1940) 2 et in Not. Syst. ac Geograph. Inst. bot. Tbilisiens. IX (1940) 24.

Perennial; root ascending, ca. 8 mm thick; stem single, 50–60 cm high, erect, slightly flexuose, violet in lower half, glabrous, finely ribbed, with obliquely antrorse branches nearly from base; radical leaves oblong, glabrous, glaucescent, 6 cm long, ca. 1.5 cm wide, numerous (?), bipinnate, with linear or narrowly lanceolate, 5–12 mm long, 1–1.5 mm lobules. Umbels 1–2 cm across, of 2–3 very unequal rays obscurely scabrous above; involucre absent; umbellets many-flowered, 4–5 mm across, on scabrous-hairy pedicels as long as flowers or shorter; involuclers of 7–8-linear-lanceolate, acute, dorsally short-haired leaflets nearly as long as pedicels or shorter; petals white or faintly violet, dorsally hardly scabrous; ovary densely covered with velutinous hairs; stylopodium flat-conical; ripe fruit unknown. July–August.

Limestone slopes. — Caucasus: *S. Transc.* (Daralagez). Endemic. Described from the Arpa-Chai River ravine, ca. 1,500 m. Type in Leningrad.

Series 7. *Eriocarpa* Schischk. — Stems branching above, umbels of 5–10 rays, ovary and fruit hairy, involucre usually present.

19. *S. eriocarpum* (Schrenk) B. Fedtsch. in Rast. Turkest. (1915) 617. — *Libanotis eriocarpa* Schrenk in Bull. phys.-math. Acad. Pétersb. II (1843) 195.

504 Perennial; root rather thick, 3–7 mm, erect or ascending; stems usually few, 20–60 cm high, finely ribbed, erect, glabrous or short-scabrous-hairy, branching above with short branches in upper part; radical leaves oblong or ovate, with petiole 5–12 cm long, 1.5–3.5 cm wide, glabrous or slightly scabrous-hairy, petiole short (1–4 cm long); primary lobes short-petioluled, pinnatisect, secondary lobes deeply pinnatisect into linear sharp-tipped lobules, 3–15 mm long, 1–1.5 mm wide. Umbels 2–4 cm across, of 5–15 nearly equal, densely short-haired rays; involucler of 5–10 linear, long-acuminate, sometimes recurved leaflets $\frac{1}{2}$ to $\frac{1}{3}$ the length of the umbel rays, short-haired outside, with scarious margins; umbellets ca. 8 mm across, on short-haired pedicels nearly as long as or slightly longer than flowers; involuclers of 8–10 lanceolate, hairy, acuminate leaflets as long as pedicels becoming recurved; petals white or faintly violet, densely short-haired above; fruit short-haired, 3 mm long, 1.5 mm wide, with prominent ribs. July–August. (Plate XXXIII, Figure 3.)

Southern stony slopes, solonetzic meadows. — W. Siberia: Irt.; Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from Ulu-Tau Mountains. Type in Leningrad.

20. *S. incanum* (Steph.) B. Fedtsch. Rast. Turkest. (1915) 617. — *S. graveolens* Ldb. Fl. alt. I (1829) 340; Fl. Ross. II. 278. — *Athamanta incana* Steph. ex Willd. Sp. pl. I (1798) 1402. — *Libanotis patriniana* DC. Coll. Mém. V (1829) 48; Prodr. IV, 150. — *L. vulgaris* §. *incana* DC. Prodr. IV (1830) 150. — *L. incana* B. Fedtsch., Perech. rast. Turkest. III (1909) 94; Kryl., Fl. Zap. Sib. VIII, 2072. — Ic.: Ldb. Ic. pl. Fl. Ross. II, tab. 104.

Perennial; root thick, to 1 cm across, erect or ascending, its neck densely covered with brown leaf remnants; stem erect, 25–60 cm high, branching, finely ribbed, like leaves covered with short thick hairs; radical leaves numerous, 10–15 cm long, 1–6 cm wide, on 1–2.5 cm long petioles, their blade oblong-ovate or narrowly triangular, many times pinnatisect; primary lobes unequal (1.5–5 cm long), crowded, the lower more than 3 times, the upper less than twice pinnatisect into linear slightly fleshy 1–2 mm long lobules; lower cauline leaves similar to the radical but lobules much longer (to 8 mm); upper leaves smaller and less dissected, the short sheaths with white-membranous margins. Umbels 6–10 cm across, of 15–30 rays; involucre absent or of 1 leaflet; umbellets many-flowered, 10–15 mm across; involucels of 12–13 lanceolate, acuminate leaflets sometimes with bi-tridentate apex, nearly as long as
505 pedicels; calyx-teeth ovate-lanceolate, acuminate, $\frac{2}{3}$ the length of the white, ca. 1.5 mm long petals, bearing stiff short hairs outside; fruit ovoid, 4 mm long, 2.5 mm wide, covered with short stiff hairs. June–July. (Plate XXXII, Figure 3.)

Stony slopes. — W. Siberia: Irt. (SW-Karachek Mountains, Bunkuldak River), Alt. (vicinity of Ust-Kamenogorsk); Centr. Asia: Balkh. (Ayaguz, Monrak, Kichkine-Tau, Kenderlyk, Saikan Mountain). Endemic. Described from vicinity of Ust-Kamenogorsk. Type was in Berlin.

21. *S. abolinii* (Korov.) Schischk. comb. nov. — *Phlojodicarpus abolinii* Korov. in Bot. mat. Gerb. Bot. Sada, V (1924) 74.

Perennial; entire plant glaucescent; root rather thick, woody, branching, its neck densely covered with fibrous leaf remnants; stems few, 20–25 cm high, angular and scattered-hairy above; radical leaves numerous, sub-glabrous, their petioles hairy, shorter than oblong pinnatisect blade, entire leaf 10 cm long, 3 cm wide; primary lobes nearly ovate, pinnatisect into lanceolate, entire or pinnatifid lobules; cauline leaves smaller, sessile on narrowly lanceolate sheath. Umbels 3–4 cm across, of 6–11 densely pubescent rays; involucre of 5 lanceolate, herbaceous, unequal leaflets, sometimes twice cleft at apex, shorter than umbel rays; umbellets 8–10 mm across, dense; flowers short-pedicel; involucre of 5–8 lanceolate leaflets nearly as long as umbellet rays; calyx-teeth lanceolate, densely pubescent, half the length of the white, glabrous, obovate, short-clawed, slightly notched petals with inward curved lobe, 1.3–1.8 mm long; fruit oblong-elliptic, densely hairy, 6 mm long, 3.5 mm wide, dorsal ribs thickish, the lateral twice as wide as the dorsal; canals narrow, single in valleculeae,

2 toward commissure; stylopodium short-conical; styles reflexed, nearly three times as long as stylopodium. July. (Plate XXXIV, Figure 5.)

Stony localities in forest belt. — Centr. Asia: Dzu-Tarb. (SW-Dzungarian Ala-Tau). Endemic. Described from Kondzhet, Tur-Aigyr and other mountains. Type in Leningrad.

22. *S. songoricum* Schischk. sp. nov. in Addenda XV, 436.

Perennial; root thick, multicipital; stems few or many, 24–25 cm high, erect, slightly branching above, like leaves covered with very short scabrous hairs; radical leaves numerous, their petioles as long as or shorter or slightly longer than blade, gradually dilated to sheath, the blade oblong, 3–8 cm long, 0.5–2 cm wide, bi- or tripinnatisect into 2–5 mm long, 0.5–1 mm wide lobules, with short mucro; cauline leaves 1–3, similar to the radical but smaller, sessile on expanded sheath. Umbels of 5–10 densely hairy unequal rays; involucre of 3–5 ovate, acuminate, densely hairy leaflets; umbellets ca. 1 cm across, many-flowered; involucels of 11–13 ovate-lanceolate, basally connate, acute leaflets with narrow scarious margins, covered with short thick hairs beneath; calyx-teeth triangular; petals white, dorsally glabrous, with inward curved tip; young fruit densely hairy; ripe fruit unknown; stylopodium short-conical; styles reflexed, longer than stylopodium, often violet. July.

Pebbly slopes. — Centr. Asia: Dzu-Tarb. (Dzungarian Range). Endemic. Described from Altynemel pass. Type in Leningrad.

23. *S. lehmannianum* (Bge.) Boiss. Fl. or. II (1872) 967. — *S. fed-schenkoanum* α. *kokanicum* Rgl. et Schmalh. in A. P. Fedchenko, Puteshestvie v Turkestan, 18 (1881) 30. — *S. karateginum* Lipsky in Tr. Bot. Sada, XXIII, 1 (1904) 141. — *S. kokanicum* Lipsky ex B. Fedch., Rast. Turkest. (1915) 616. — *Libanotis lehmanniana* Bge. in Mem. sav. etr. Petersb. VII (1851) 300. — *L. marginata* Korov. in Bot. mat. Gerb. Bot. Sada, V (1924) 73. — *L. nevskii* Korov. in Sistem. zam. Gerb. Inst. bot. i zool. AN UzSSR, VIII (1947) 19. — *L. unicaulis* Korov. Ibid. (1947) 18. — *L. merkulowiczii* Korov., Ibid. (1947) 16.

Perennial; root thick, 5–7 mm across, multicipital, its neck covered with remnants of petioles; stems few, 20–80 cm high, erect, finely ribbed, like leaves covered with short velutinous hairs, branching from middle or above; radical leaves numerous, the short petioles gradually dilated to sheath, the blade oblong or lanceolate, bipinnatisect into 3–4 more or less remote pairs of leaflets of the first order, borne on short petiolules, these in turn dissected into linear-lanceolate or linear acute lobules, 0.7–3 cm long, 2–7 mm wide; upper leaves smaller and less dissected. Terminal umbels 2–4.5 cm across, long-peduncled, of 5–20 unequal rays finely pubescent above; involucre of 2–7 linear-lanceolate, acuminate, pubescent leaflets with scarious margin, half the length of the rays; umbellets 4–10 mm across; pedicels covered with short velutinous hairs; involucels of 10–12 linear-lanceolate, long-acuminate, pubescent leaflets with scarious margin, as long as or longer than pedicels; petals white or pink, pubescent outside; ovary tomentose; fruit oblong-ovoid, 3–4 mm long, 1.5–2 mm wide, densely pubescent, with inconspicuous ribs; stylopodium reddish; canals large, single in valliculae, 2 toward commissure. July–August.

Stony, rocky and wormwood slopes, taluses, sandy terraces to 2,500 m. — Centr. Asia: Pam.-Al., T. Sh. (W.). Endemic. Described from cliffs in the subalpine zone of the Kara-Tau Mountains, near Samarkand. Type in Paris.

24. *S. turbinatum* Korov. in Bot. mat. Gerb. Inst. bot. i zool. AN UzSSR, VIII (1947) 21.

Perennial; stems high, finely furrowed, glabrous, branching, the branches short, 1 undeveloped lying at base of stem; leaves bilaterally glabrous, their petioles sulcate, flat above, half the length of the blade, blade oblong-oval, with 5 remote sessile or short-petioled primary lobes bipinnatisect into 10–12 mm long, 2.5–3 mm wide, lanceolate, acute lobules with revolute margin; upper cauline leaves reduced to linear-lanceolate sheaths. Umbels of 4–5 softly pubescent rays to 1–2.5 cm long, thickening in fruit; involucre absent; umbellets thick, 20-flowered; involucels of 9–11 lanceolate leaflets free nearly to base, as long as umbellets; flowers sessile; calyx edentulate; petals oblong-oval, with sharp inward curved tip, 1 mm long, pubescent outside; stylopodium conical; styles as long as stylopodium is wide; fruit (unripe) oblong-ovoid, gray-hairy, 4.5 mm long, dorsally compressed, the ribs inflated, the margins expanded to a frill; canals wide, single under valliculae, 4 toward commissure. July.

Mountain slopes. — Centr. Asia: T. Sh. (W.). Endemic. Described from Koitash Mountains. Type in Tashkent.

Series 8. *Fasciculata* Schischk. — Umbels of 5–9 rays, ovary and fruit hairy, leaves oblong, with lobes of the first order whorled.

25. *S. fasciculatum* Korov. in Herb. Leninopol. — *Libanotis fasciculata* Korov. in Byull. Sredneaz. Gos. univ. XIV, Dopln. (1926) 11. — Exs.: H. F. A. M. No. 240.

508 Perennial; root 6–13 mm thick, multicapital; stems many, erect, 25–40 cm high, their base covered with remnants of sheaths, obscurely finely ribbed, branching nearly from base or from middle, covered with short scabrous hairs below, rarely glabrous, subglabrous above; radical leaves numerous, short-scabrous-hairy, petioles more or less long, with short sheaths, blades narrowly oblong, 4–8 cm long, 1–2 cm wide, the sessile primary lobes bipinnatisect nearly to base into approximate linear-lanceolate 2–7 mm long, 0.5–1 mm wide lobules. Umbels 1–3 cm across, terminating stem and reduced branches, of 7–9 unequal, glabrous or short sparsely hairy rays; involucre of 5 linear, acuminate leaflets or absent; umbellets many-flowered (to 20), with short unequal pedicels slightly longer than flowers and covered with short hairs; involucels of 5 linear leaflets; petals pink in the middle, rest white, dorsally glabrous; ovary densely pubescent; fruit ovoid-oblong, 3–4 mm long, 1.2–1.5 mm wide, covered with short velutinous hairs; stylopodium short-conical; styles reflexed, slightly longer than stylopodium. Fl. July–August, Fr. September.

Variegated, stony, and gypsiferous-sandy slopes, to 2,100 m. — Centr. Asia: T. Sh. (Chimgan, Chotkal, Atbashi, Naryn). Endemic. Described from the subalpine belt of Greater Chimgan. Type in Leningrad.

26. *S. korovinii* Schischk. in Bot. Mat. Gerb. Bot. Inst. AN SSSR, XIII (1950) 162.

Perennial; root thick, its neck covered with brown leaf remnants; stems few or nearly single, erect, 35–65 cm high, finely ribbed, very short scabrous hair in lower half, subglabrous above, with obliquely antrorse branches from middle or nearly from base; radical leaves numerous, scabrous-hairy, oblong-linear, their short petioles, abruptly dilated into sheath, bipinnatisect, 7–20 cm long, ca. 1.5 mm wide; primary lobes subsessile, the lower remote, the upper approximate, dissected to base into lanceolate-linear or linear, 4–10 mm long, 0.5–1 mm wide, acute lobules with revolute margins; cauline leaves similar to the radical but smaller, the terminal with obsolete blade; umbels 1.5–2.5 cm across, of 5–7 unequal short-scabrous-hairy rays; involucre of 5 erect lanceolate-linear acuminate hairy leaflets; umbellets small, 3–4 mm across, 7–10-
509 flowered; involucels of 5 linear acuminate hairy leaflets, shorter than umbellet; calyx-teeth persistent; petals white, dorsally subglabrous, ca. 1 mm long; fruit ovoid, 5 mm long, 2.5 mm wide, densely hairy; stylopodium short-conical; styles reflexed, nearly as long as stylopodium; mericarps with 3 prominent ribs. Fl. July, Fr. September.

Southern slopes and fallows. — Centr. Asia: Pam.-Al. Endemic. Described from the basin of the Kashka Darya River. Type in Leningrad.

Series 9. *Tenuisecta* Schischk. — Stems branching, umbels small, 0.8–3 cm across, terminal lobules filiform or linear.

27. *S. tenuisectum* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestvozn. antrop. i etnograf. XXXIV, 2(1881) 31.

Perennial; root thick, 5–8 mm across; stems usually few, 50–100 cm high, glabrous, finely ribbed, with obliquely spreading branches in upper part; radical leaves numerous, glabrous, ovate-oblong, simple or bipinnatisect into 3–4 pairs of primary linear lobes bearing 2–3 narrowly linear 2–8 cm long, 0.5–1 mm wide lobules, petioles long, gradually dilated to sheath, together with petioles 7–30 cm long, 2–6 cm wide. Umbels small, 0.8–1.2 cm across, of 7–11 short glabrous rays, sometimes slightly hairy above; involucre of 5–7 lanceolate acute erect leaflets with ciliate margins, much shorter than umbel rays; umbellets 5–10-flowered; pedicels as long as or slightly longer than flowers, sparingly pubescent; involucels of 5–7 lanceolate acute antrorse leaflets; petals white or whitish-greenish, glabrous outside; stylopodium short-conical; styles reflexed, as long as or longer than stylopodium; fruit scabrous-hairy, oblong, 3 mm long, 1 mm wide (ripe fruit unknown). Fl. August, Fr. September.

Stony slopes, grass-wormwood solonchak associations, limestone cliffs. — Cent. Asia: Pam.-Al., Syr D., T. Sh. (W.). Endemic. Described from Chotkal Range and Chirchik. Type in Leningrad.

28. *S. iliense* (Rgl. et Schmalh.) Lipsky in B. Fedch., Rast. Turkest. (1915) 616. — *S. fedtschenkoanum* β . *iliense* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestvozn. antrop. i etnograf. XXXIV, 2 (1882) 31. — *S. altissimum* M. Pop. in Bot. mat. Gerb. Bot. Inst. AN SSSR, VIII, 5 (1940) 72.

510 Perennial; root to 2 cm thick, its neck covered with remnants of sheaths; stem erect, 1–2 m high, 1–2 cm thick, cylindrical, short-haired, with long spreading branches nearly from base; radical leaves numerous, 40–50 cm long, on short-haired short petioles dilated in sheath, their blade many times pinnatisect into linear-filiform glabrous acute, 2–5 cm long, 0.2–0.3 mm wide lobules; cauline leaves similar to the radical but smaller, branches nearly leafless. Umbels 2–3 cm across, of few unequal (1–2 cm long) short-haired rays; involucre of 5–10 lanceolate dorsally short-haired long-acuminate leaflets, with narrow scarious margin, shorter than umbel rays; umbellets 5–6 mm across, the numerous sessile flowers crowded in globular head; involucels of 6–7 ovate-lanceolate acuminate leaflets as long as or longer than flowers; calyx-teeth short, filiform; petals white, glabrous; stylopodium conical; styles reflexed; fruit sub-cylindrical, 3–4 mm long, densely pubescent. July–August. (Plate XXXII, Figure 1.)

Cliffs and stony slopes, semideserts. — Centr. Asia: Dzu-Tarb. (south of Dzungarian Ala-Tau), Balkh. (SE), T. Sh. (NE, Zailiiskii Ala-Tau). **Gen. distr.:** Dzu.-Kash. (Sinkiang). Described from Koibin ravine. Type in Leningrad.

29. *S. giganteum* Lipsky in Tr. Bot. Sada, XXIII, 1 (1904) 140. — *Libanotis juncea* Korov. in Sistem. zam. Gerb. Inst. bot. i zool. AN UzSSR, VIII (1947) 17.

Perennial; root 1–1.5 cm thick, obliquely ascending, its neck covered with dark brown fibrous leaf remnants; stem erect, 150–300 cm high, glaucous-green, glabrous, cylindrical, hollow, with obliquely antrorse branches; radical leaves early withering; cauline leaves sessile on oblong dilated sheath, broadly triangular, glabrous, bi- or nearly tripinnate; into 1–8 cm long, 1–3 mm wide, lanceolate-linear, acute lobules, gradually tapering to petiolules; upper leaves reduced to bladeless sheath, or with obsolete blade. Umbels subcapitate ca. 1.5 cm across, terminating stem and branches, of 6–10 distally pubescent rays; involucre absent or of 4–6 ovate-lanceolate leaflets; umbellets ca. 4 mm across, 10–20-flowered, on short-haired peduncles; involucels of 6–10 linear-lanceolate acuminate, densely hairy free leaflets; calyx-teeth lanceolate-subulate; petals greenish-violet, hairy outside, with inward curved tip, 0.8 mm long; ovary and young fruit densely hairy; stylopodium pulviniform, with undulant margin; styles reflexed, longer than stylopodium. July–August.

Stony slopes and gravels in dry riverbeds, on slopes among Central Asian juniper and spruce 1,500 m. — Centr. Asia: T. Sh. (W., Uspenskoe, Khodzha-Aty River, Karasul, Mogol-Tau). Endemic. Described from Fergana (Khodzha-Aty River valley). Type in Leningrad.

30. *S. aemulans* M. Pop. in Bot. mat. Gerb. Bot. Inst. AN SSSR, VIII, 4(1940) 73.

Perennial; root thick, branching above, multicipital, its neck not covered with fibrous leaf remnants; stems few, 35 cm high, with thin striae, branching from base, like leaves glabrous, glaucescent; radical leaves numerous, their more or less long petioles dilated to sheath, their blade bipinnatisect, with remote petioluled primary lobes parted into linear or

linear-filiform 0.7–2.5(3) cm long, 0.5–1 mm wide lobules; cauline leaves few, smaller, the uppermost squamiform. Umbels 1–2 cm across, short-peduncled terminating stem and branches, of 2–4 unequal spreading rays; involucre of 2–5 broadly ovate squamiform leaflets; umbellets 3–5 mm across, 10-flowered, thick, with sessile flowers; leaflets of involucels 5–7, lanceolate-subulate, hairy, shorter than umbellets; petals pale yellow, sometimes nearly white, dorsally hairy; stylopodium conical; styles recurved, longer than stylopodium; fruit densely short-haired, dorsally compressed, ovoid-oblong, 7–8 mm long, with thickish ribs and broad valleculae. August.

Stony gypsiferous desert. — Centr. Asia: T. Sh. Endemic. Described from near Charyn. Type in Leningrad.

31. *S. squarrosus* Schischk. in Bot. mat. Gerb. Bot. Inst. AN SSSR. XIII (1950) 162.

Perennial; root ca. 8 mm thick, multicapital; stems few, erect or slightly ascending at base, their base covered with divergent thick often violet leaf remnants, finely ribbed, whitish, sometimes violet below, slightly shiny, glabrous, short-haired only at flowering, with short, obliquely antorse branches in upper half; lower cauline leaves oblong, their blade 5–8 cm long, 2–4 mm wide, tripinnatisect, with long petioles exceeding blade, abruptly dilated to short broadly ovate sheath with scarious margins, with markedly protruding veins; upper leaves smaller and less dissected, sessile on short sheaths. Umbels 0.8–1.2 cm across, of 2–5 ribbed slightly unequal densely haired rays; involucre of 2–5 ovate acute 1–3 mm long very short-haired leaflets with scarious margin; umbellets ca. 4 mm across, with densely crowded, nearly capitate flowers on short pedicels; involucels shorter than umbellets of 7–9 ovate-lanceolate short-haired acute leaflets, connate at base; petals greenish covered with velutinous hairs outside; ovary densely hairy; ripe fruit not known; stylopodium short-conical. July–August.

Stony slopes. — Centr. Asia: Balkh. Endemic. Described from the western fringes of Betpak-Dala. Type in Leningrad.

Series 10. *Flavidae* Schischk. — Flowers yellowish, umbels of 7–13 glabrous rays, fruit hairy.

32. *S. valentinae* M. Pop. in Bot. mat. Gerb. Bot. Inst. AN SSSR, VIII, 4 (1940) 73. — *Lomatopodium lessingianum* var. *tenuifolia* Rgl. et Herd. in Bull. Soc. Nat. Mosc. XXXIX, 3 (1866) 85.

Perennial or biennial; root fusiform, its neck covered with fibrous leaf remnants; stem 40–70 cm high, cylindrical, with thin striae, thinly pubescent at base, glabrous above, with long spreading branches nearly from base; radical leaves few, oblong, 5–10 cm long, 2.5–3 cm wide, on short scabrous-hairy petioles, the blade bipinnatisect; primary lobes remote, petioluled, dissected into 2–5 narrowly linear or filiform-linear, 5–10 mm long, 0.5–1 mm wide lobules with slightly revolute margin, cauline leaves sessile on oblong sheaths with membranous margin, the leaves smaller, nearly simple-pinnate; uppermost leaves with reduced blade. Umbels 3–10 cm across, terminating stem and branches, of 7–13 unequal

glabrous or sparingly pubescent rays, compacted in fruit; involucre absent; umbellets dense, capitate, 5–10 mm across; leaflets of involucels 10–12, lanceolate-linear, acuminate, pubescent, nearly as long as pedicels; petals yellowish; ovary densely pubescent; stylopodium short-conical; styles reflexed, $1\frac{1}{2}$ times as long as stylopodium; fruit ovoid, 2.5 mm long, 1.5 mm wide, densely hairy. (Plate XXXIII, Figure 2.)

Stony slopes. — Centr. Asia: T. Sh. Endemic. Described from the Chilik River on Kungei Ala-Tau. Type in Leningrad.

- 513 Section 2. HIPPOMARATHROIDEA DC. Coll. Mém. V (1828) 47, emend. — Leaflets of involucels connate for half their length or more, fruit ovoid, 2–4 mm long.

33. *S. hippomarathrum* Jacq. Enum. Stirp. Vindob. (1762) 52; L. Sp. pl. ed. 2 (1762) 374 (series); Ldb. Fl. Ross. II, 272, excluding var. *hebecarpum*; Shmal'g., Fl. I, 397, ex p. — *S. articulatum* Crantz, Stirp. austr. ed. 1, III (1767) 91. — *S. hippomarathrum* subsp. *eu-hippomarathrum* Thell. in Hegi, III. Fl. Mitteleur., V, 8 (1926) 1231. — *Sium hippomarathrum* Roth, Tent. Fl. Germ. I (1788) 128. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 1913, 1952 (1864).

Perennial; root 5–7 mm thick; stems few or single, 20–50 cm high, erect, slightly branching in upper part, glabrous; leaves crowded on root neck and lower part of stem, oblong or oblong-ovate, with petiole 10–15 cm long, 3–8 cm wide; petioles of lower leaves 2–5 cm long, of upper shorter, dilated to sheath; blade tripinnatisect into linear 4–12 mm long, 0.5–1 mm wide lobules. Umbels ca. 2 cm across, of 10–20 unequal glabrous rays; involucre absent or of few leaflets; umbellets 5–7 mm across; flowers short-pedicel; involucels multifoliate, their leaflets connate nearly to apex; calyx-teeth inconspicuous; petals white, broadly obovate, dorsally glabrous, 1–1.5 mm long; young ovaries sometimes slightly velutinous-hairy; fruit glabrous, ca. 3 mm long, 2 mm wide. July.

Slopes. — European part: Balt., U. Dnp. (Kiev Region), U. Dns., Bes.? Gen. distr.: Centr. Eur., Bal. (N.). Described from Europe. Type in Vienna.

34. *S. ledebourii* G. Don, Gener. Syst. of Gard. and Bot. III (1834) 308; Kryl., Fl. Zap. Sib. VIII, 2064. — *S. hippomarathrum* β . *hebecarpum* DC. Prodr. IV (1830) 144; Ldb. Fl. Ross. II, 272. — *S. hippomarathrum* Shmal'g., Fl. I, 397, ex p. — *S. hippomarathrum* subsp. *hebecarpum* Drude in E. — P. Pflanzenfam. III, 8 (1898) 202.

- Perennial; root rather thick; stem erect, 25–65 cm high, glabrous, slightly branching above; radical and lower cauline leaves numerous, glabrous sometimes scabrous, oblong-ovate, tripinnatisect into 0.5–2 cm long, 0.5–1 mm wide linear lobules, with petioles 7–20 cm long, 2–7 cm wide; upper leaves smaller, less parted, on short petioles dilated to amplexicaul sheath. Umbels 2–3 cm across, rather dense, of 10–20 unequal rays glabrous or sparsely covered with hairs at one side; involucre absent or few-leaved; umbellets 5–7 mm across; involucels of many leaflets, connate to middle or beyond with white-scarious margin, nearly as long as
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umbellets; calyx-teeth obscure; petals white, broadly obovate, 1–1.5 mm long; fruit 3 mm long, 2 mm wide, densely covered with short stiff hairs. June–July.

Chernozem and solonetzic steppes, solonetzic meadows, in exposed habitats, often rock or limestone slopes, cliffs. — European part: V.-Kama (E.); W. Siberia: Ob, U. Tob., Irt., Alt. (N.); Centr. Asia: Ar.-Casp., Balkh. (N.). Endemic. Described from Altai. Type in London.

35. *S. alexeenkoi* Lipsky in Tr. Tifl. Bot. Sada, VI, 1 (1902) 55; Grossg., Fl. Kavk. III, 165.

Perennial; root vertical, ca. 4 mm thick, its neck densely covered with brown remnants of petioles; stem 30–70 cm high, usually single, rarely few, thin, 2–2.5 mm across, glabrous, ribbed, erect or slightly flexuose, bearing slightly obliquely ascending branches from middle up; radical leaves numerous, glabrous, on 3–6 cm long petioles dilated to sheath, blades lanceolate-oblong, 5–10 cm long, 1–4 cm wide, tripinnate, with more or less remote primary lobes and narrowly linear, 0.5–2 cm long, 0.4–1 mm wide lobules, with very short mucro; cauline leaves few, less dissected, the upper simple-pinnate, small. Umbels of 2–3(6) smooth unequal lobes; involucre absent; umbellets dense, 2–3 mm across, nearly capitate; flowers on short pedicels as long as flowers or shorter; involucels of 7–8(10) leaflets connate nearly to top; petals whitish with dark stripe, glabrous; ovary with fine very short pubescence; stylopodium flat-conical; fruit ovoid, 3 mm long, 1.5 mm wide, sparingly pubescent, with prominent white ribs. July–August.

Dry slopes on limestone, 900–1,200 m. — Caucasus: Dag. Endemic. Described from Dagestan (Dargin). Type in Leningrad.

36. *S. dichotomum* Pall. Tab. Taur. (1797) 49, nom. nud.; M. B. Fl. taur.-cauc. I (1808) 265; Ldb. Fl. Ross. II, 273; Shmal'g., Fl. I, 398; Grossg., Fl. Kavk. III, 165. — *Bubon rigidior* Spreng. Pug. II (1815) 53, non Waldst. et Kit. — *B. rigidus* var. β . Spreng. in Schult. Syst. veg. VI (1820) 497. — *B. dichotomus* Link, Enum. Hort. Berol. (1821) 278. — Ic.: Sims, Bot. Mag. tab. 2073. — Exs.: G. R. F. No. 1020.

515 Perennial; entire plant glaucous, thinly covered with velutinous hairs; stem erect, 40–100 cm high, strongly branching with short branches; radical leaves oblong, 3–15 cm long, 1–2(4) cm wide, bipinnatisect, their short petioles dilated to sheath; the lobules narrowly linear, 1–2 cm long, 0.5–1 mm wide, very short-scabrous-hairy; cauline leaves appressed to stem, smaller and less dissected, sessile on expanded sheaths. Umbels many, ca. 2 cm across, terminating stem and short branches, of 5–9 unequal sparsely pubescent thickish faceted rays; involucre absent; leaflets of involucels ovate, acuminate, connate for $\frac{1}{3}$ of their length, sparsely covered with velutinous hairs, their free parts broadly scarious, sometimes more or less violet; petals white; fruit ovoid, glabrous (?), 2.5 mm long, 1.5 mm wide; stylopodium short-conical; styles much longer than stylopodium, curved outside at middle. July–August.

Southern limestone slopes, limestone cliffs, marl pebbly slopes, shrubby formations, juniper thickets (*Juniperus excelsa*). — European part: Crim.; Caucasus: Cisc. Endemic. Described from the Crimea. Type in Leningrad.

37. *S. rupicola* Woron. in Tr. SPb. obshch. estestvoisp. XXXIV (1905) 26; Grossg., Fl. Kavk. III, 165.— Exs.: Fl. cauc. exs. No. 17.

Perennial; rhizome obliquely ascending, ca. 10 mm thick; stem 50–80 cm high, its base covered with brown fibrous leaf remnants, densely leafy, branching from middle, finely ribbed, glabrous below, covered with short soft hairs above; lower leaves broadly triangular, their petiole 25 cm long, ca. 20 cm wide, tripinnatisect into filiform, 2.5–5 cm long lobules; upper leaves smaller, simple-pinnate. Terminal umbel 4–8 cm across, of 20–35 densely hairy rays, lateral umbels longer than the terminal, 3–4 cm across, of 10–15 rays; involucre absent; umbellets 5–7 mm across, many-flowered; leaflets of involucels numerous, narrowly triangular-lanceolate, densely hairy, with scarious margins, thin-acuminate above, longer than umbellet, connate for $\frac{1}{4}$ – $\frac{1}{3}$ of their length; calyx-teeth conspicuous; petals whitish or whitish-greenish; young fruit ovoid, densely hairy. July–August.

Limestone cliffs.—Caucasus: W. Transc. (Abkhazia). Endemic. Described from Petskir ravine and Kodor River. Type in Leningrad.

38. *S. karatavicum* Schischk. in Bot. mat. Gerb. Bot. Inst. AN SSSR, XIII (1950) 163.—*Libanotis marginata* Pavl. in Herb. Inst. Bot. non Korov.

516 Perennial; root vertical, 7–8 mm thick; stems few, 30–60 cm high, erect, short-scabrous-hairy, with subhorizontally diverging short, slightly leafy branches nearly from base or middle; radical leaves numerous, short-haired, narrowly oblong, the petioles abruptly dilated to sheath, 7–15 cm long, ca. 1 cm wide, bipinnate with remote primary lobes and lanceolate, 5–7 mm long, 0.5–2 mm wide, acute lobules with revolute margins; cauline leaves smaller and less dissected. Umbels subglobular, thick, 1–2 cm across, of 8–9 short thick unequal densely hairy rays; involucre absent; umbellets many-flowered, with subsessile or short-haired pediceled flowers; involucels of triangular-lanceolate, thinly acuminate leaflets connate for half their length; fruit ovoid, 3.5 mm long, 1.5 mm wide, densely covered with short hairs, ribs slightly protruding; stylopodium short-conical, with undulant margins; styles longer than stylopodium reflexed. July.

Pebbly and stony slopes.—Centr. Asia: T. Sh. (W.). Endemic. Described from Kara-Tau Range. Type in Leningrad.

Section 3. LOMATOPODIUM (Fisch. et Mey.) Schischk. comb. nov.—Gen. *Lomatopodium* Fisch. et Mey. in Bull. phys.-math. Acad. Pétersb. III (1845) 305.—Leaflets of involucels connate to above middle, fruit oblong, 5–7 mm long, 2 mm wide, densely hairy.

39. *S. cuneifolium* M. B. Tableaux des provinces (1798) 58, nom. nud.; Beschr. d. Länder zwischen den Flüssen Terek u. Kura (1800) 159, descr.; Fl. taur.-cauc. I (1808) 236; DC. Prodr. IV, 145; Ldb. Fl. Ross. II, 274; Boiss. Fl. or. II, 962; Grossg., Fl. Kavk. III, 165.—*Bubon cuneifolius* Spreng. Syst. I (1819) 900.

Perennial; stems 50–90 cm high, strongly branching from base, very short-scabrous at nodes and above with glaucescent leaves; radical leaves glabrous, numerous, on 6–8 cm long petioles abruptly dilated to short sheath scabrous-hairy outside, the leaves broadly ovate, bipinnatisect with 2, rarely 3 pairs of primary lobes, the lower pair on arcuate 8–12 cm long petiolules with 1 pair of obtuse, distally largely and unequally toothed sessile leaflets, gradually tapering at base, upper leaflets trifid nearly to middle, with large-toothed lobes, lower cauline leaves similar to the radical, but with narrower ovate-lanceolate or lanceolate lobes; upper leaves
517 smaller, with simple-pinnate lobes. Umbels of 4–7 rays rather densely covered with short stiff hairs; involucre absent; umbellets of many short, ca. 0.5–1 cm long densely pubescent leaflets connate to middle; petals white, hairy outside; stylopodium obscurely conical; styles twice as long as stylopodium, divergent; fruit (young) ovoid-oblong, densely covered with rather long white hairs. July.

Dry southern mountain slopes, 1,000–1,200 m. — Caucasus: E. Transc. Endemic. Described from Kurtbulak. Type in Leningrad.

40. *S. jomuticum* Schischk. in Bot. mat. Gerb. Bot. Inst. AN SSSR, XIII (1950) 163.

Perennial; stem and leaves glaucescent, stem 60–100 cm high, branching, very short-scabrous in lower part, glabrous above (sometimes with exception of inflorescence) and at nodes; radical and lower cauline leaves numerous, on very long petioles (10–22 cm) abruptly dilated to short (7 mm) sheaths, with 10–18 nerves dorsally protruding like ribs and membranous margins; blades simple or bipinnate, on lowermost leaves with primary leaflets on more or less long petioles, their blade dissected into broadly obtuse lobes with unequal, broadly triangular, acute teeth, the upper leaves with more or less reduced cylindrical-subulate spinose-tipped lobes. Inflorescence strongly branching, often with opposite branches, terminating in umbels of 2–3 unequal rays, glabrous or covered with stiff short hairs; involucre absent; umbellets 5–7 mm across, with many subsessile flowers; leaflets of involucre broadly triangular, acute, connate for more than half, covered with very short stiff hairs; petals white, with sparse hairs outside; fruit oblong, densely hairy, with 3 ribs strongly protruding dorsally, with narrow whitish bilateral wings finely toothed, 7 mm long, 2 mm wide. Fl. July–August, Fr. September. (Plate XXXIII, Figure 1.)

Dry beds and banks of mountain rivers. — Centr. Asia: Ar.-Casp. (Lesser Balkhan), Kara.-Kuk. (Krasnovodsk District). Endemic. Described from near Akhcha-Kuima station. Type in Leningrad.

41. *S. platyphyllum* (Schrenk) O. et B. Fedtsch. in Perech. rast. Turkest. III (1909) 94. — *Lomatopodium platyphyllum* Schrenk in Bull. phys.-math. Acad. Pétersb. III (1845) 306.

518 Perennial; root ca. 1–2 cm across, erect or ascending; stem single, 70–100 cm high, branching from base, ca. 7–12 mm thick, very short-scabrous-hairy below, glabrous in upper part; radical leaves numerous, their petioles ca. 10 cm long, their blade 8–15 cm long, 7–12 cm wide, broadly ovate, bipinnatisect; primary lobes on 1.5–5 cm long petiolules, pinnatisect, usually with 2 pairs of ovate-cuneate, 4–5 cm long, 1.5–2 cm

wide, unequally toothed or incised, glabrous lateral segments; cauline leaves smaller and less dissected. Umbels 3–5 cm across, of 2–3(4) nearly equal rays covered with stiff spreading hairs; involucre absent; umbellets very dense, subglobular, 5–16 mm across; leaflets of involucre densely hairy outside, ovate-lanceolate, acuminate, connate for half; petals white, densely hairy outside; ovary with thick spreading hairs; styles longer than stylopodium, with capitate stigma; young fruit oblong, densely hairy, 5 mm long, 2 mm wide. July. (Plate XXXIV, Figure 4.)

Sands and stony slopes. — Centr. Asia: Balkh. (Khai-Tyn-Su, Hantau, Balkhash, Ili River). Endemic. Described from Khantau Mountains. Type in Leningrad.

42. *S. eriocephalum* (Pall.) Schischk. comb. nov. — *S. lessingianum* Turcz. in Bull. Soc. Nat. Mosc. XIV (1841) 429; Ldb. Fl. Ross. II, 273; Voronov in Fl. Yugo-Vost. Evrop. ch. SSSR, V (1931) 800. — *Bubon eriocephalus* Pall. ex Spreng. Syst. I (1825) 900. — *Lomatopodium lessingianum* Fisch. et Mey. in Bull. phys.-math. Acad. Pétersb. III (1845) 305.

Perennial; root vertical, ca. 8 mm across; stem erect, 40–80 cm high, short-haired, sometimes subglabrous in middle part, branching, finely ribbed; radical leaves numerous, the petioles 5–10 cm long, abruptly tapering to short sheath; leaf blade broadly ovate or broadly triangular, nearly tripinnatisect; primary lobes on 2–4 cm long petiolules; lobules narrowly obcuneate or lanceolate or sublinear, with short mucro, 3–5 mm long, 1–2 mm wide, often with revolute margins. Umbels 2–5 cm across, usually of 5–15 unequal, spreading-hairy rays; involucre absent; umbellets many-flowered, 8–9 mm across; flowers subsessile, crowded in subglobular head; involucre of many ovate-lanceolate connate leaflets densely hairy outside; fruit oblong, 6 mm long, 2 mm wide, with 3 thick prominent dorsal ribs and 2 broadened winglike lateral ribs. Fl. July, Fr. September. (Plate XXXIV, Figure 3.)

519 Solonchaks, often wet, taluses, chee grass thickets, chalky hills. — W. Siberia: U. Tob. (SW); Centr. Asia: Ar.-Casp., Balkh., Kara K., T. Sh. (W.). Endemic. Described from Indersk Lake. Type in London.

Note. In their "Enumeratio plantarum anno 1840 in regionibus altaicis et confinibus collectarum" (1841) 61, Karelin and Kirillov mention two unnamed varieties α . and β . Later Stscheglejew (in Bull. Soc. Nat. Mosc. XXVII, 1 (1854) 167) separated variety β . as *Lomatopodium karelinianum* Turcz. ex Stschegl. For want of material this species could not be interpreted.

Section 4. *MACROSTYLOPODIUM* Schischk. sect. nov. in Addenda XV, 437. — *Stylopodium* pyramidal-conical, half the length of the fruit, styles shorter than stylopodium, reflexed, ripe fruit subglabrous.

43. *S. coronatum* Ldb. Fl. alt. I (1829) 336; Fl. Ross. II, 276; Kryl., Fl. Zap. Sib. VIII, 2067. — *S. connatum* Walp. Rep. II (1843) 402, erron. — Ic.: Ldb. Ic. pl. Fl. Ross. II, tab. 169.

Perennial; root thick, multicipitate; stems few, 35–50 cm high, glaucescent, branching, glabrous, sometimes scabrous with faintly visible hairs in upper part; radical leaves glaucous, glabrous, numerous, their 5–7 cm long petioles dilated to sheath, their blade oblong, 7–20 cm long, 2–7 cm wide, bipinnate, with 5–6 pairs of primary leaflets; secondary lobes lanceolate or linear, acuminate, 5–15 mm long, 1–2 mm wide, entire or deeply trisect, rarely pinnatisect; cauline leaves 2–3, similar to the radical but smaller and less dissected, uppermost often reduced to sheath. Umbels 3–6 cm across, of 6–10 glabrous rays; involucre absent or of 2 lanceolate thinly acuminate leaflets with scarious margins, short-scabrous outside, early deciduous, several times shorter than umbel rays; umbellets 4–6 mm across, 10–15-flowered, on short rays, as long as or slightly longer than flowers; involucels of 8–9 lanceolate acuminate scabrous leaflets with scarious margins, recurved; calyx-teeth inconspicuous; petals whitish-greenish, subrounded, entire, curved inward; ovary and unripe fruit glabrous or short-haired, ripe fruit glabrous, dorsally flattened, broadly ovoid, 4–5 mm long, 3 mm wide; stylopodium conical, 1 mm long; styles much shorter than stylopodium, reflexed; mericarps with 3 dorsal, acute, prominent, ribs and 2 marginal winglike extensions, ca. 0.5 mm wide. June.

520 Stony slopes, shrubby formations, semideserts, sandy steppes. — W. Siberia: Irt. (SE); Centr. Asia: Balkh. (Zaisan basin). Endemic. Described from "Dzungarian-Kirghiz" desert. Type in Leningrad.

44. *S. asperulum* (Trautv.) Schischk. comb. nov. — *S. coloratum* var. *asperulum* Trautv. in Tr. Bot. Sada, I (1871) 32.

Perennial; root thick, multicipital, its neck densely covered with remnants of petioles; stems few or single, 25–50 cm high, in lower half short-scabrous-hairy; radical leaves glaucescent, with spreading scabrous hairs, oblong, 8–12 cm long, 1.5–2 cm wide, their petioles slightly shorter than blade, the blade bi- or nearly tripinnate; lower primary lobes on petiolules, the others usually sessile; lobules 3–10 mm long, 0.5–1.5 mm wide, acute; cauline leaves 3–5, smaller and less dissected; upper leaves with reduced blade. Umbels 1.5–2.5 cm across, of (4)6–10-scabrous-hairy rays; involucre absent; umbellets ca. 5 mm across; involucels of 5–6 lanceolate-linear acute leaflets with scarious scabrous margins; young fruit densely hairy, ripe fruit subglabrous, with stylopodium 5–6 mm long, 3 mm wide, with narrow rim; stylopodium ca. 1 mm long; styles reflexed, shorter than stylopodium. June–July. (Plate XXXIV, Figure 7.)

Cliffs and dry sandy steppes. — Centr. Asia: Dzu-Tarb. (Dzungarian Ala-Tau). Endemic. Described from Dzungaria. Type in Leningrad.

45. *S. sessiliflorum* Schrenk in Bull. phys.-math. Acad. Pétersb. III (1845) 307.

Perennial; root thick, multicipital; stems few, erect, 15–50 cm high, glabrous, with few obliquely antrorse branches; radical leaves glabrous, numerous, oblong with petioles 6–15 cm long, 1–3 cm wide, bipinnatisect into linear-lanceolate or narrowly linear, acute, 2–12 mm long, 1–2 mm wide, usually entire, rarely few-toothed lobules, often with revolute margins; cauline leaves few, smaller, sessile on short sheath. Umbels 1.5–2.5 cm



PLATE XXXIII. 1—*Seseli jomuticum* Schischk.; 2—*S. Valentinae* M. Pop.; 3—*S. eriocarpum* (Schrenk) B. Fedtsch.

23 across, usually of 3 (rarely 2 or 4–5) smooth rays, one of these very short, thus umbellet appearing subsessile; involucre of 2–3 broadly lanceolate leaflets with membranous margins, 1–2 mm long, sometimes absent; flowering umbellets 4–7 mm across, with many subsessile flowers in a almost capitate inflorescence; involucels of 5–10 lanceolate slightly hairy acute leaflets becoming recurved, half the length of the flowers or shorter; petals white or pale yellowish, sparsely pubescent outside; stylopodium conical, nearly half the length of the fruit [sic]; ovary and fruit pubescent, fruit ovoid, 3 mm long (without stylopodium), 1.5 mm wide densely covered with white hairs. June–July. (Plate XXXII, Figure 2; Plate XXXIV, Figure 1.)

Cliffs, stony deserts, sandy-pebbly slopes. — Centr. Asia: Ar.-Casp., Balkh., T. Sh. (foothills), Syr D. Gen. distr.: Dzu.-Kash.? Described from Kantau Mountains. Type in Leningrad.

Section 5. *ERIOSCIAS* Schischk. nom. nov. — Sect. *Pimpinelloides* Rgl. in *Izv. Obshch. lyubit. estestv. antrop. i etnogr.*, XXXIV, 2 (1882) 31, non Boiss. — Fruit ovoid, dorsally compressed, densely hairy; leaves bipinnate, with broadly ovate leaflets.

46. *S. macrophyllum* Rgl. et Schmalh. in A. N. Fedchenko, *Putesh. in Turkest.* 18 (1881); *Izv. Obshch. lyubit. estestv. antrop. i etnogr.*, XXXIV, 2 (1882) 31. — *Athamanta macrophylla* Korov. in *Sched. ad Herb. F. A. M.* (1926) No. 239.

Perennial; root 1.5–3 cm across; its neck densely covered with fibrous leaf remnants; stems hollow, 0.5–1.5 mm high, 8 mm thick below, covered with short rather thick scabrous hairs, hence grayish, with obliquely antrorse branches; radical leaves broadly ovate, short-scabrous-hairy, bipinnatifid, 40–60 cm long, 20–40 cm wide, on long petioles dilated to sheath; primary lobes on long petiolules with 1–2 pairs of 4.5–12 cm long, 3.5–10 cm wide leaflets, truncate or obscurely cordate at base, petioluled or sessile; upper leaflets usually larger, often with 3 distinct lobes. Umbels 5–10 cm across, of 13–23 unequal short-haired rays; involucels of 10–11 narrowly lanceolate acuminate recurved or spreading, 2–10 mm long, densely pubescent leaflets; umbellets 5–6 mm across; the flowers on short unequal hairy pedicels; leaflets of involucels narrowly lanceolate, 24 8–10, densely hairy, shorter than or as long as pedicels; petals white or greenish-yellowish, densely hairy outside; fruit nearly tomentose, ovoid, 5–6 mm long, 2.5 mm wide. Fl. July–August, Fr. September. (Plate XXXIV, Figure 6.)

Stony and shrubby slopes, fine earth slopes and taluses, to 2,500 m. — Centr. Asia: Syr D., T. Sh., Pam.-Al. Endemic. Described from Shakhimardan. Type in Leningrad.

Section 6. *PSEUDOSILAUS* Schischk. sect. nov. in *Addenda XV*, 438. — Fruit oblong, glabrous, pedicels spreading in fruit, involucre and involucels present.

47. *S. foliosum* (Somm. et Lev.) Manden. in Not. Syst. ac Geograph. Inst. bot. Tbilisiens. 10 (1941) 76. — *Silaus foliosus* Somm. et Lev. in Nuov. Giorn. botan. ital. (1895) 75 and in Tr. Bot. Sada, XVI (1900) 190. — *Silaum foliosum* Grossh. in Fl. Kavk. III (1932) 170. — Ic.: Manden. l. c. p. 77 (1841) fruit.

Perennial; entire plant glabrous; root fusiform, its neck densely covered with fibrous leaf remnants; stems cylindrical, finely furrowed, 30–75 cm high, 4–6 mm thick, branching nearly from base, with obliquely antrorse or spreading branches, usually overtopping central umbel; radical and lower cauline leaves ovate, their long petioles abruptly dilated to short sheath; blade 8–10 cm long, 3–6 cm wide, bi- tripinnatisect, the lower of the 4–5 pairs of primary lobes petioluled, lobules linear, mucronate, 0.7–2 cm long, 1–3 mm wide; upper cauline leaves smaller, less dissected, sessile on short sheath; uppermost leaves with obsolete 3-partite or simple-pinnate blade. Umbels 2–4 cm across, of 3–10 thinly scabrous or subglabrous rays; leaflets of involucels 5–8, linear or narrowly lanceolate, reflexed, much shorter than rays; calyx-teeth inconspicuous; petals yellow, elongate-ovate, hardly notched, with inward curved tip; stylopodium conical, with undulant frill; styles erect or divergent, becoming reflexed, shorter than stylopodium, very short; fruit glabrous, oblong, 3 mm long, ca. 1 mm wide, with filiform ribs; canals 1 per vallecule, 2 toward commissure; fruiting pedicels $1\frac{1}{2}$ times as long as fruit, divergent. June–July. (Plate XXIV, Figure 2.)

Stony mountain slopes. — Caucasus: W. Transc. Endemic. Described from Adzharia, between Adzharia-Tskhali and Keda. Type in Venice.

525 Genus 1025. **SPHENOCARPUS*** Korov.

Korov. in Bot. mat. Gerb. Inst. bot. i zoolog. AN UzSSR, VIII (1947) 22

Flowers bisexual; calyx with well developed, lanceolate, membranous teeth hardening along midrib; petals white, with narrow inward curved limb; stylopodium pulviniform, contracted at base; styles long, stigma capitate. Fruit compressed laterally, tapering to short hollow pedicel; mericarps subcylindrical, with broad commissure, their ribs filiform, inflated, with a bundle of sclerenchyma; resinous canals, single, broad, close to endocarp, 2 toward commissure; seeds flat toward commissure; carpophore adnate to mericarp; pericarp thin; endocarp of large oil-containing cells, mesocarp parenchymatous, after abscission of fruit there remain on the pedicel numerous short protuberances which encircle the hollow lower part of the fruit. Perennial herbs, with pinnatisect leaves.

Monotypic genus, known from the eastern part of Fergana.

1. *S. eryngioides* Korov., Ibid. 23.

Perennial; taproot(?) vertical, its neck not branching, covered with remnants of petioles; stem single, ca. 75 cm high, cylindrical, finely furrowed, branching from middle; leaves thickish, coriaceous when dry, glabrous, shiny; radical and lower cauline leaves on short, flattened, furrowed petioles with acute margins, their blade oblong-oval, of 2–3 removed pairs of

* From the Greek *sphen* — wedge, *carpon* — fruit.

sessile, oval-rhombic sections, pinnatipartite into lanceolate, entire or 2-3-fid or dentate, ca. 3 cm long lobules; median and upper cauline leaves sessile on short, lanceolate, stiff, semi-amplexicaul sheaths; primary lobes cut into 3 lanceolate lobules. Umbels many-rayed (30-45), thick, semiglobose, the rays thickish, furrowed, unequal, 1-3 cm long; involucre of 10-12 narrow lanceolate-linear stiff acute leaflets half the length of the rays; umbellets dense, semiglobose, 35-45-flowered, with involucels of 13-15 narrow lanceolate acute leaflets with ciliate margin, connate at base, as long as umbellets; flowers sessile; calyx with large membranous acute hardening teeth, as long as petals; petals 1 mm long; stylopodium pulvinate; styles thick spreading, 2.2-3 mm long; fruit compressed laterally, oblong, slightly attenuate at base, short-haired, 3-5 mm long, with sharply protruding filiform ribs; resinous canals broad, single between ribs, 2 toward commissure. August-September. (Plate XXXIV, Figure 8.)

Ravines, banks of streams. — Centr. Asia: Pam.-Al. (E.). Endemic. Described from the Itokar River ravine. Type in Tashkent.

Genus 1026. **OENANTHE*** L.

L. Sp. pl. (1753) 254. — Phellandrium L. Sp. pl. (1753) 255. — Actinanthus Ehrenb. in Linnaea, IV (1829) 398. — Dasyloma DC. Prodr. IV (1830) 140. — Cyssopetalum Turcz. in Bull. Soc. Nat. Mosc. XXII, II (1849) 25. — Oenosciadium Pomel, Nouv. Mat. Fl. Atl. (1874) 141. — Globocarpua Car. in Parl. Fl. Ital. VIII (1889) 239.

Calyx-teeth lanceolate, enlarging, and persistent in fruit; petals white or reddish, obovate, more or less deeply notched or deeply notched or with 2 deep slits, with inward curved lobe. Peripheral flowers of umbels often staminate, with more or less elongate peripheral petals, the lateral ones with unequal lobes; stylopodium conical; styles elongate, erect or spreading; fruit ovoid-oblong or subglobular, dorsally or laterally slightly compressed, its pericarp usually with thick, corky-spongy aerenchyma, thus fruit readily floating on water; dorsal ribs wide, low, obtuse, sometimes approximate, marginal ribs larger; vascular bundles accompanied by a plate of stereomes, penetrating rather deeply into pericarp. Perennial herbs, of river banks and shores of water bodies, with bi- or tripinnate leaves, often with tuberiform thickenings of roots.

Up to 35 species distributed all over the globe, but mainly in Europe, Asia, and Africa; 11 species are known from the USSR.

Economic importance. Oenanthe is regarded as poisonous. Its toxic effect is attributed to the tarry substance enanthotoxin contained especially in the roots. Poisoning of domestic animals is mostly due to feeding on plants left in ditches after clearing.

Note. Most of the relevant material was extremely inadequate. Further collections of entire plants — flowers, fruits and root system — are needed to arrive at a precise determination of the species.

* From the Greek oinanthe (oinos — wine, anthos — flower) — Theophrastus' name for an umbellifer with flowers smelling like wine. Pliny claims that the flowers smell like those of the grapevine.

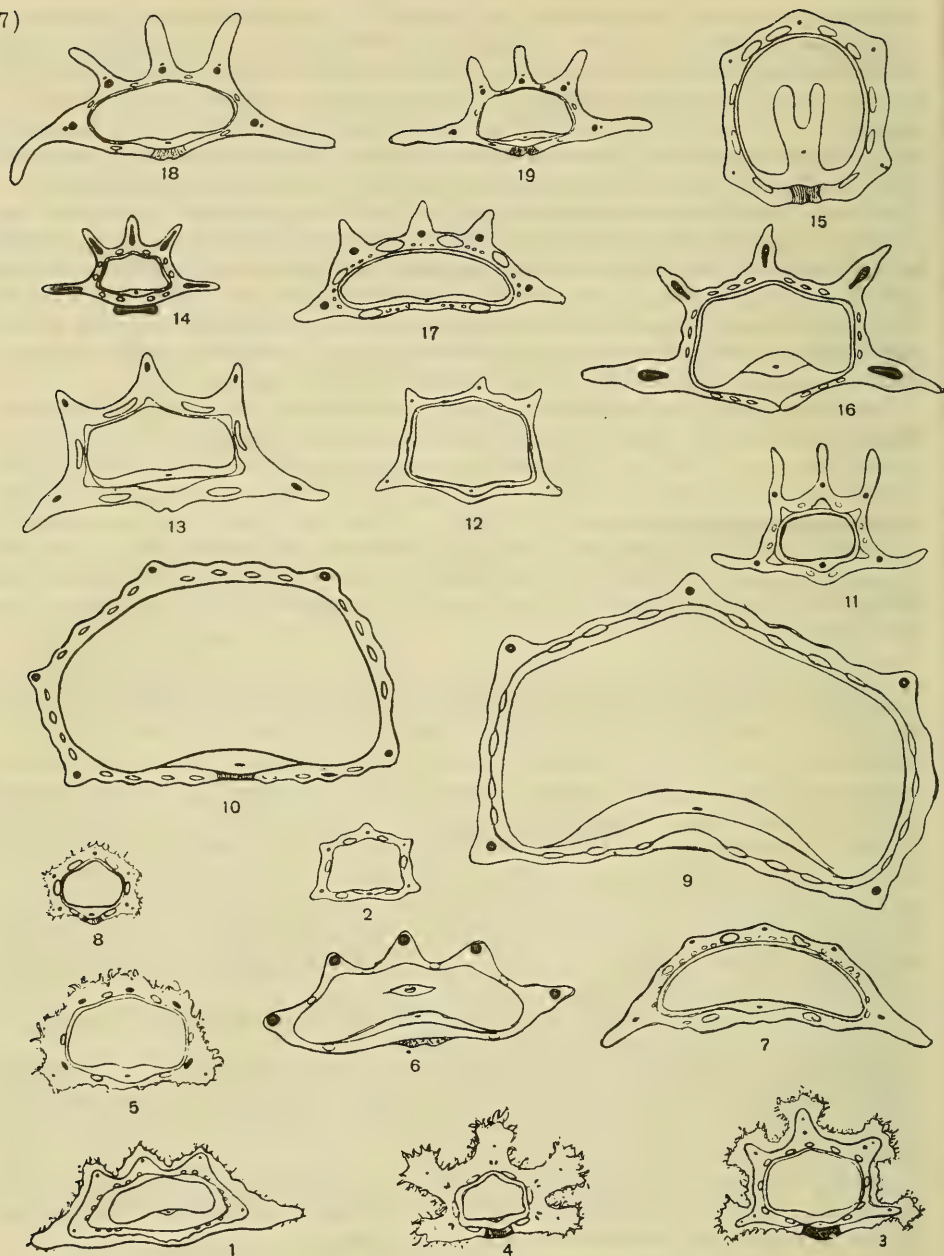


PLATE XXXIV. Cross sections of mericarps (scheme). 1 — *Seseli sessiliflorum* Schrenk.; 2 — *S. foliosum* (Somm. et Lev.) Mand.; 3 — *S. eriocephalum* (Pall.) Schischk.; 4 — *S. platyphyllum* (Schrenk) O. et B. Fedtsch.; 5 — *S. abolinii* (Korov.) Schischk.; 6 — *S. macrophyllum* Rgl. et Schm.; 7 — *S. asperulum* (Trautv.) Schischk.; 8 — *Sphenocarpus eryngioides* Korov; 9 — *Schultzia albiflora* (Kar. et Kir.) M. Pop.; 10 — *S. crinita* (Pall.) Spreng.; 11 — *Cnidium cnidiifolium* (Turcz.) Schischk.; 12 — *C. ajanense* (Rgl. et Til.) Drude.; 13 — *C. multicaule* (Turcz.) Ldb.; 14 — *Selinum carvifolia* L.; 15 — *Scaligeria kopetdaghensis* (Korov) Schischk.; 16 — *Ligusticum mongholicum* (Turcz.) Kryl.; 17 — *L. physospermifolium* Alb.; 18 — *Pachypleurum mucronatum* (Schrenk.) Schischk.; 19 — *P. gayoides* (Rgl. et Schmalh.) Schischk.

1. All flowers bisexual, fertile, nearly as long as pedicels; plants with reduced rhizome 2.
- + Peripheral flowers of umbels staminate, on longer pedicels than the inner flowers; plants with bundle of roots without rhizome 3.
2. Styles 2.5 mm long in fruit, umbel rays 2–5 cm long (Far East) 10. *O. decumbens* (Thunb.) K.-Pol.
- + Styles ca. 1 mm long in fruit, umbel rays 1–2 cm long 11. *O. aquatica* (L.) Poir .
3. Stems with crown of thin roots at lower nodes, producing leafy creeping radican shoots; submerged leaves with narrowly linear, subfiliform lobules; main umbel of 2–4 thickish hollow rays (axillary umbels of 6–10 thin rays); fruit pyriform or subcylindrical; styles persistent, spinose 2. *O. fistulosa* L.
- + Characters different 4.
4. Large plants, 60–100 cm high; stems hollow; leaves many times pinnatisect; leaf lobules oblong-linear, 7–10 mm long, 1–2 mm wide; leaflets of involucels narrowly linear, as long as umbellets (*S. Transcaucasia*) 9. *O. sophiae* Schischk.
- + Plants usually not as large, 20–60 cm high; leaves bi- or tripinnate, their lobes wider in lower leaves; leaflets of involucels lanceolate, shorter than umbellets 5.
5. Root filiform, with terminal spherical or ovoid thickening (Black Sea coast in the Crimea and Caucasus) 1. *O. pimpinelloides* L.
- + Root cord-like, oblong or clavately thickened 6.
6. Styles thin, more or less recurved 8. *O. banatica* Heuff.
- + Styles thickish, erect 7.
- 30 7. Involucre of 3–5 leaflets always present . . 7. *O. abchasica* Schischk.
- + Involucre absent 8.
8. Fruit with unequal dorsal ribs, one mericarp with only 2 lateral ribs, the other with 1 markedly protruding median rib 4. *O. heterococca* Korov.
- + All fruits equal 9.
9. Fruit ovoid, nearly all flowers fertile (Centr. Asia) 5. *O. fedtschenkoana* K.-Pol.
- + Fruit prismatic; peripheral flowers sterile (*S. European part of the USSR and Caucasus*) 10.
10. Leaf lobules 2–5 cm long, 2–5 mm wide; fruiting pedicels hardly thickened 6. *O. longifoliolata* Schischk.
- + Leaf lobules 4–15 mm long, 2.5–3 mm wide; fruiting pedicels nearly as thick as fruit; peripheral flowers elongating (to 2–3 mm long) 3. *O. silaifolia* M. B.

Section 1. OENANTHAE verae Koch, Synops. Fl. Germ. (1837) 321. — Group *Euoenanthe* Neilr. Fl. Nied.-Oesterr. (1859) 61. — Rhizome absent; roots usually thickened, in bundles; peripheral flowers of umbellets staminate, long-pedicel, inner flowers bisexual, fertile, short-pedicel.

1. *O. pimpinelloides* L. Sp. pl. (1753) 255; Ldb. Fl. Ross. II, 269; Boiss. Fl. or. II, 958; Shmal'g., Fl. I, 396; Grossg., Fl. Kavk. III, 169.— *Phellandrium matthioli* Bub. Fl. Pyren. II (1900) 370.— Ic.: K.-Pol., Vestn. Tifl. Bot. Sada, ed. 33, Table and p. 14, Fig. 3 (section of fruit).— Exs.: G. R. F. No. 1766.

Perennial; roots in bundles of thin fibers, abruptly passing to ovoid or spherical terminal tuber 4–10 mm across; stem thinly ribbed, 25–70 cm high, hollow, branching above; radical leaves bi- or nearly tripinnatisect, their petioles longer or shorter than blade, abruptly passing to dilated often violet sheath, the blade oblong or ovate, 8–10 cm long, 3–5 cm wide; primary lobes on short petiolules, the secondary obcuneate, sessile, more or less deeply dentate or pinnatifid, teeth (sometimes lobules) lanceolate, acute, 2–7 mm long, 1–2 mm wide; lower cauline leaves more or less similar to the radical, the median and upper simple-pinnate, with long linear lobules, 1–4 cm long, 0.5–1 mm wide. Umbels 2–4 cm across, of 8–15 thickened rays slightly scabrous above, thickening in fruit; involucre
531 and involucels of 1–8 narrowly linear thinly acuminate herbaceous leaflets; umbellets 0.5–1 cm across; petals white, more or less deeply notched, the peripheral hardly elongating, ca. 2 mm long; fruit prismatic, 2.5 mm long, their short thick pedicels nearly as thick as fruit; stylopodium short-conical; styles erect, 3 mm long. June.

Shrubs, oak forests, damp meadows, sides of ditches, coastal pine forests, ornamental and kitchen gardens. — European part: Crim. (southern shore); Caucasus: W. Transc. Gen. distr.: Med., As. Min. Described from Montpellier and S. Europe [sic]. Type in London.

2. *O. fistulosa* L. Sp. pl. ed. 1 (1753) 254; Ldb. Fl. Ross. II, 268; Boiss. Fl. or. II, 955; Shmal'g., Fl. I, 396; Grossg., Fl. Kavk. III, 168.— *Oe. lanceolata* Poir. Encycl. Suppl. IV (1816) 135.— *Oe. fistulifolia* Stokes, Bot. Mat. Med. II (1812) 111.— *Oe. filipendula* Dumort. Fl. Belg. Prodr. (1827) 80.— *Oe. meifolia* Schloss. et Vuk. in Fl. croat. (1869) 453.— *Oe. biloba* Dulac, Fl. Haut.-Pyr. (1867) 353.— *Phellandrium fistulosum* Clairv. Man. d'herborisation (1819) 86.— *Phellandrium dodonaei* Bubani, Fl. Pyren. II (1900) 368.— *Selinum fistulosum* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 96.— Ic.: Kozo-Pol., Vestn. Tifl. Bot. Sada. 34 (1914) Table and page 14, Fig. 1.

Perennial; entire plant glabrous, pale green; rhizome with fibrous or filiform or thickened roots; stem erect or ascending, 30–100 cm high, cylindrical, thinly furrowed, hollow, at lower nodes with crown of thin roots producing creeping leafy radican shoots from base; and with obliquely antrorse branches above; lower cauline leaves long-petioled, tripinnatisect into oblong, obtuse, short-mucronate, lobules on lower leaves; lobules of submerged leaves narrowly linear, subfiliform; upper cauline leaves bi- or nearly simple-pinnate, with blade slightly shorter than the (often slightly inflated) hollow petiole and short sheath hardly wider than petiole, with narrow scarious margin; lobules subrounded, turbinate, oblong or sublinear, acute or obtuse. Umbels on thick hollow peduncles, of 2–4 1–2 cm long thickish hollow rays, umbellets with predominantly bisexual fertile flowers, subsequent axillary umbels appear terminal because of the strongly developed peduncle, of 6–10 thin rays, mostly with staminate flowers; involucre absent or of 1–2 early deciduous leaflets; leaflets of involucels many,

2 lanceolate, with narrow scarious margins; calyx-teeth elongate-subulate, exceeding 1 mm long; petals white or reddish, the peripheral elongating, to 4 mm long, obcordate, gradually cuneate at base, with very narrow notch $\frac{1}{3}$ to $\frac{1}{2}$ of their length, broad, slightly overlapping rounded lobes, and inward curved elongate, filiform-subulate terminal lobe; umbellets dense in fruit, subglobular; fruit very short-pedicel, pyriform or subcylindrical, 3–4 mm long, the main and secondary ribs thick, nearly equal; stylopodium short; styles persistent, long and spinose. July.

Ditches and banks of streams. — European part: M.D.; Caucasus: Tal.
Gen. distr.: Centr. and Atl. Eur., Med., Iran. Described from Europe.
Type in London.

3. *O. silaifolia* M. B. Fl. taur.-cauc. III (1819) 232; Ldb. Fl. Ross. II, 269; Boiss. Fl. or. II, 957; Shmal'g., Fl. I, 396; Grossg., Fl. Kavk. III, 169. — *O. biebersteinii* α . *vulgaris* Simon in Rev. bot. syst. et geogr. bot. I (1903) 93. — *O. brevisecta* Simon, l.c. (1903) 96, quoad plant. Cauc. septentr. — *O. caucasica* Simon, l.c. (1903) 101. — *O. grandisecta* Simon, l.c. (1903) 98, quoad pl. Bessarab. — *O. radiata* Sakalo in Ucheni Zap. Khar'k. Derzh. univ. 22 (1941) 190. — Ic.: Kozo-Pol. in Vestn. Tifl. Bot. Sada, 34 (1914) Table to page 14, Figure 4.

Perennial; root in bundles with oblong or clavate thickenings; stem ribbed, 25–50 cm high; radical leaves early withering, oblong-ovate bi- or tripinnatisect, their petioles longer or shorter than blade, gradually passing to cylindrical, hardly dilated sheath; lobules lanceolate or linear-oblong, 4–15 mm long, 0.5–3 mm wide; cauline leaves similar to the radical; the upper smaller. Umbels 4–5 cm across, the 3–10 ribbed, obscurely scarious rays slightly thickened in fruit; involucre absent or of 1–3 linear leaflets; umbellets ca. 0.8 mm across; involucels of 7–11 ovate-lanceolate leaflets, much shorter than outer umbel rays; petals white, the peripheral ovate, tapering to claw, dissected nearly for half their length, peripheral petals elongating (2–3 mm); umbel slightly compressed in fruit; fruit prismatic, truncate above and below, 2–2.5 mm long, 1–1.4 mm wide; primary ribs thickish, with indistinct annular thickening; pedicels thickened, shorter than fruit; styles erect, 2–2.5 mm long. May–June.

Banks of streams and ditches. — European part: Bes., U. Dns., Bl., Crim.; Caucasus: Cisc., E. and S. Transc., Tal. **Gen. distr.:** Med., Bal.? Iran. Described from the southern coast of the Crimea (Nikita). Type in Leningrad.

533 Note. In M. Bieberstein's herbarium at the V. L. Komarov Botanical Institute of the Academy of Sciences of the USSR, there are two specimens, one with young flowers collected by Steven near the village of Nikita, the other with young fruits. Although in his diagnosis Bieberstein writes "*Corollis aequalibus*" the peripheral petals are elongated to 2.5–3 mm. Separating *O. caucasica* from Talysh, Simon (l.c.) states that the only difference from *O. silaifolia* is the absence of thickened roots (yet in the Note to this species he refers to the presence of a thickened root in one specimen). The numerous specimens from Lenkoran (Talysh) nearly all have thickened roots, like the type of *O. silaifolia*.

4. *O. heterococca* Korov. in Botan. mat. Gerb. Inst. bot. i zool. AN UzSSR, XII (1948) 13.

Perennial; root a bundle of cylindrical and filiform fibers thickened downwards; stem hollow, cylindrical, furrowed, ca. 50 cm high, with elongate spreading branches nearly from base; lower leaves petiolate, their blade triangular, tripinnatisect into linear, entire or incised, acute, 7–8 mm long lobules; median and upper leaves sessile on narrow sheath; lobules of uppermost leaves shorter. Umbels of 10 ca. 3 cm long, furrowed, later thickened rays on long, nearly ribbed peduncles; involucre absent or 1-leaved; umbellets dense, semiglobular; leaflets of involucels 6–8, lanceolate, acuminate; peripheral flowers of umbels staminate, pediceled, the inner pistillate, sessile or on short pedicels thickening in fruit; calyx-teeth lanceolate, acuminate; stylopodium flat; styles erect, 2 mm long, shorter than fruit; fruit turbinate, 3 mm long, its ribs thickened distally, dorsal ribs asymmetrical – one mericarp bearing 2 lateral, the other only 1 median strongly protruding rib; canals narrow, a continuous layer of stereomes in the pericarp is interrupted only near carpophore. July.

Marshes. – Centr. Asia: Pam.-Al. (Shakhrisayabz). Endemic. Described from Shakhrisayabz. Type in Tashkent.

5. *O. fedtschenkoana* K.-Pol. in Izv. Bot. Sada, XVI (1916) 226 and Fl. Az. Rossii, 15 (1920) 11. – Ic.: Kozo-Pol., Fl. Az. Ross. Figure 1, III (fruit), Table 2.

534 Perennial; entire plant glabrous; roots in bundles fusiformly thickened; stems single, cylindrical, 50 cm high, strongly furrowed-faceted, slightly branching; leaves bipinnatisect, shorter than internodes, triangular-ovate, their short petioles dilated to narrow sheath, lobules sessile, oblong-linear, tapering at both ends, acute, entire, 4 cm long, 4 mm wide. Umbels axillary or opposite leaves, peduncles 2–3 times as long as subtending leaves; rays 8–14, glabrous, nearly equal; involucre absent or of 1–3 deciduous leaflets; umbellets many-flowered; involucels of 5–10 lanceolate leaflets, nearly as long as umbellets; fruit ovoid, ca. 2 mm long, with discrete bundles of fibers under ribs; canals 1 per vallecule (2 dorsal ones), ribs with aerenchymous, albumen subcircular in cross section. June.

Shores of inland water bodies. – Centr. Asia: Syr D. Endemic. Described from Kokand. Type in Moscow.

6. *O. longifoliolata* Schischk. sp. nov. in Bot. mat. Gerb. Bot. inst. AN SSSR, XIII (1950) 164. – *Oe. lachenalii* auct. fl. cauc. non Gmel.

Perennial, pale green plant; root fusiform; stems single, erect, 65–80 cm high, furrowed, branching from middle; lower leaves oblong, long-petioled, bipinnatisect into linear or lanceolate-linear, 2–5 cm long, 2–5 mm wide, entire lobules, upper leaves simple-pinnate, with linear lobes. Umbels 3–5 cm across, of 7–10 unequal, thin, smooth, slightly winged rays; involucre absent or of 1–3 deciduous leaflets; involucels of 7–12 linear-lanceolate leaflets shorter than umbel rays; peripheral flowers in umbel sterile, calyx-teeth lanceolate-triangular, reflexed in fruit, in sterile flowers the 2 outer teeth elongating to 1 mm, petals white, bisected, with acute inward curved tip; in sterile flowers outer petals oblong-obcordate, elongated, ca. 3 mm long; fruiting pedicels thick, short; fruit oblong-obconical,

2–3 mm long, laterally compressed, ribs thick-filiform; stylopodium short-conical; styles erect, 2 mm long. May–June.

Damp meadows, shores of inland bodies of water. — Caucasus: Tal. Endemic. Described from Talysh. Type in Leningrad.

7. *O. abchasica* Schischk. sp. nov. in Bot. mat. Gerb. Bot. inst. AN SSSR, XIII (1950) 164.

Perennial; entire plant glabrous; roots gathered in bundles, cordlike to thickened; stems single, 40–70 cm high, furrowed-faceted, more or less branching; leaves ovate, bipinnatisect, usually shorter than inter-
535 nodes, their petioles shorter than blade, gradually dilated to narrow sheath; lobules narrowly lanceolate or sublinear, acute, 0.5–2.5 cm long, 0.5–2 mm wide, tapering at both ends, upper leaves simple-pinnate. Umbels terminating stem and branches and opposite, in axils of leaves on long peduncles, 2.5–3.5 cm across; rays 10–17, glabrous, nearly equal; involucre of 3–7 unequal linear acuminate leaflets; umbellets many-flowered; involucels of 7 linear acuminate leaflets as long as umbel rays; peripheral flowers of umbel sterile; petals white, the peripheral elongating to 2.5 mm, more or less deeply notched; fruit ovoid, 3 mm long, 1.5 mm wide, on short, hardly thickened pedicels; stylopodium short-conical; styles straight, somewhat divergent, 1.5–2 mm long. June–July.

Shores of lakes and edges of swamps. — Caucasus: W. Transc. (Abkhazia, Sochi). Endemic. Described from Lake Skurcha (Abkhazia). Type in Leningrad.

8. *O. banatica* Heuff. in Flora, XXXVII (1854) 291. — Exs.: Fl. exs. austro-hung. No. 620; Fl. exs. Reip. Bohem.-Slov. No. 1083.

Perennial; roots in a bundle of 5–6, fusiform, gradually thickened at base and apex, mixed with few filiform roots; stem 60–90 cm high, erect, strongly faceted-ribbed, hollow, branching in upper half; leaves bi- or nearly tripinnate, the lower early withering, triangular-ovate, long-petioled, the median 8–12 cm long, 5–6 cm wide below on petioles shorter than blade, gradually dilated to amplexicaul sheath; primary and secondary lobes petioluled, lobules oblong-linear or ovate-lanceolate, 4–15 mm long, (0.5)1–2(3) mm wide, acute; upper leaves smaller, simple-pinnate, sessile on expanded sheath. Umbels 5–6 cm across, of 5–13 smooth rays, sometimes scabrous above; involucre of 1–3 early deciduous leaflets; umbellets many-flowered, 10–14 mm across; involucels of 7–9 unequal lanceolate leaflets (one usually larger than the rest), much shorter than pedicels of outer flowers; calyx-teeth unequal, peripheral flowers in umbel long-pediceled, usually sterile, their elongated petals obcordate, ca. 3 mm long, abruptly tapering to rather long claw, notched for $\frac{1}{4}$ of their length; fruit 3–3.5 mm long, with protruding ribs, wider than valleculeae. June–July.

Damp meadows. — European part: U. Dns. (reported for environs of
536 Lvov and Transcarpathians). Gen. distr.: Balkans. Described from Banat. Type in Budapest (?).

9. *O. sophiae* Schischk. nom. nov. — *Oe. ferulacea* Kotschy et Boiss. in Boiss. Fl. orient. II (1872) 958, non Thunb. Prodr. Fl. Cap. (1794) 50. — *Oe. armena* (C. Koch) Lipsky in Herb. Leninopol. —

Ferula armena C. Koch in Linnaea, XVI (1842) 358, non DC. (1830). — *Pycnosciadium armenum* C. Koch in schedis.

Perennial; roots in bundles, thickened, cylindrical, attenuate at base; stems cylindrical, hollow, 60–100 cm high, thinly ribbed longitudinally, slightly branching above, glabrous; radical leaves with petioles longer than blade, abruptly dilated to amplexicaul sheath, their blade oblong, 10–25 cm long, 5–7 cm wide, 3–4-pinnatisect into oblong-linear, 7–10 mm long, 1–2 mm wide lobules, median cauline leaves similar, the upper smaller, sessile on expanded sheath. Umbels ca. 7 cm across, of 10–14 smooth ribbed unequal rays; involucre absent or 1-leaved; umbellets many-flowered, 1.2 cm across; involuclers of 9–17 lanceolate acute leaflets often connate at base, nearly as long as umbel rays; fruit cylindrical-prismatic, 4–5 mm long, their thickened pedicels shorter than fruit; stylopodium short-conical; styles erect or slightly divergent, 3.5–5 mm long. June–July.

Herbaceous slopes. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. Described from Darachichag. Type in Leningrad.

Section 2. *DASYLOMA* (DC.) Benth. et Hook. Gen. Pl. I (1862–1867) 906. — Genus *Dasyloma* DC. Prodr. IV (1830) 140. — Genus *Cyssopetalum* Turcz. in Bull. XXII, II (1849) 25. — Subgenus *Dasyloma* Drude in E. — P. Pflanzenfam. III, 8 (1898) 204. — All flowers bisexual, nearly as long as pedicels, calyx-teeth deciduous, (not elongating in fruit), fruit obscurely ribbed.

10. *O. decumbens* (Thunb.) K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXIX (1915) 130; Kozo-Pol. in Fl. Az. Ross. XV (1920) 7. — *Oe. stolonifera* DC. Prodr. IV (1830) 138; Kom., Fl. Man'chzh. III, 153. — *Oe. javanica* DC., l. c. (1830) 139. — *Oe. laciniata* Zolling. System. Verz. (1854–1855) 130. — *Oe. japonica* Drude in E. — P. Pflanzenfam. III, 8 (1898) 204. — *Oe. subpinnata* Drude, l. c. (1898). — *Sium decumbens* Thunb. Fl. japon. (1784) 118. — *S. javanicum* Blume, Bijdr. Fl. Ned. Ind. XV (1826) 881. — *Phellandrium stoloniferum* Roxb. Hort. Beng. (1814) 21, nom. nud.; Fl. Ind. II (1832) 93. — *Dasyloma latifolium* Lindl. in Royle, Illustr. (1839) 232. — *D. javanicum* Miq. Fl. Ind. Batav. I (1855) 41. — *D. subpinnatum* Miq. Prolus. Fl. japon. 537 (1865–1867) 247. — *D. japonicum* Miq. Ann. Mus. Ludg.-Batav. III (1867) 59. — *D. stoloniferum* var. *japonica* Maxim. ex Franch. et Sav. Enum. pl. japon. I (1875) 185. — *Cyssopetalum javanicum* Turcz. in Bull. Soc. Nat. Mosc. XXII (1849) 25. — Ic.: Kozo-Pol., Fl. Az. Ross. XV, tabl. 1.

Perennial; entire plant glabrous; rhizome short, creeping; stems 30–50 cm high, ca. 5 mm across, decumbent, radicant below, producing creeping shoots, erect, branching above, hollow, ribbed; leaves triangular, their long petioles dilated to sheath, bipinnatisect into 2–4.5 cm long, 0.7–2 cm wide lanceolate oblong or ovate, short-petioled or sessile, cuneate, acuminate, unequally toothed, rarely lobed lobules. Umbels usually opposite leaves, ca. 5 mm across, of 5–15 rays; involucre absent or of 1–3 small deciduous leaflets; umbellets ca. 0.5 cm across; involuclers of 5–10 linear-subulate leaflets as long as umbellets; petals white;

fruit ellipsoid, 2.5–3.5 mm long, obtusely ribbed; stylopodium short-conical; styles divergent, 2.5 mm long. End July, August.

Lakes, ditches, small streams, rice fields. — Far East: Uss., Sakh.

Gen. distr.: Jap.-Ch., East Indies, Java, Australia (introduced).

Described from Japan. Type in Uppsala.

Section 3. *Phellandrium* (L.) C. Koch, Synops. Fl. Germ. (1837) 322. — Genus *Phellandrium* L. Sp. pl. (1753) 254. — Group *Phellandrium* Neilr. Fl. Nied.-Oesterr. (1859) 618. — Rhizome creeping, flowers of umbellets equal, fertile on nearly equal pedicels, fruit readily deciduous.

11. *O. aquatica* (L.) Poir. in Lam. Encycl. IV (1796) 530; Shmal'g., Fl. I, 397; Kozo-Pol. in Fl. Az. Ross. XV, page 9; Grossg., Fl. Kavk. III, 168; Kryl., Fl. Zap. Sib. VIII, 2021. — *Phellandrium aquaticum* L. Sp. pl. (1753) 254; Rupr. Fl. ingr. 441. — *Ph. divaricatum* Gilib. Fl. lithuan. II (1782) 33. — *Oenanthe phellandrium* Lam. Fl. Franc. III (1778) 432; Ldb. Fl. Ross. II, 269. — *Ligusticum phellandrium* Crantz, Stirp. Austr. ed. 1, fasc. III (1767) 84. — *Stephanorossia palustris* Chiovenda in Journ. Bot. Ital. LX (1911) 65, cfr. in Journ. of Bot. LXXI (1933) 134. — *Selinum phellandrium* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 93. — Ic.: Fl. Yugo-Vost. V, fig. 526; Kozo-Pol. in Tr. Bot. Sada, 34, 14, fig. 2; Fl., Az. Ross. 15, fig. 1, I. — Exs.: G.R.F. No. 617; Fl. polon. exs. No. 635.

Perennial; rhizome reduced, vertical, with filiform roots; stem single, 40–150 cm high, furrowed, more or less thickened at base (3–8 mm across), hollow, strongly branching, branches spreading, like leaves glabrous; leaves bi- or nearly tripinnate, 5–15 cm long and nearly as wide, with geniculately-reflexed nearly triangular blade; in submerged leaves lobes cut into filiform-elongate lobules; lower aerial leaves long-petioled, the rest short-petioled, with geniculately-reflexed triangular, bi- or nearly tripinnate-partite blade, its lobes opposite, short-petioled; lobes of the last order oblong or linear, acuminate, entire or slightly dentate, 2–8 mm long. Umbels short-peduncled, opposite leaves or axillary; involucre absent or of 1–3 small deciduous leaflets; 8–15 rays 2–2.5 cm long; involucels of 5–10 linear-lanceolate leaflets nearly as long as pedicels; flowers many, as long as pedicels; calyx-teeth unequal, linear, thinly acuminate, the longest up to 1 mm; petals white, obcordate, the peripheral slightly elongated (to 1.5 mm); fruit oblong, 2.5–4 mm long, ca. 1.5 mm wide, slightly longer than pedicels; stylopodium conical; styles thin in fruit, ca. 1 mm long, divergent or recurved.

Swamps, banks of rivers, oxbow lakes, lakes and streams, mainly in plains, not on high mountains. — European part: ubiquitous; Caucasus: Cisc., Dag.; W. Siberia: everywhere; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh. (W.). **Gen. distr.:** Scand., Centr. and Atl. Eur., Bal. Described from Europe. Type in London.

Genus 1027. **AETHUSA** * L.

L. Sp. pl. (1753) 256

Flowers bisexual; calyx-teeth inconspicuous; petals white, rarely reddish, deeply notched, with inward curved lobe, elongated in peripheral flowers; fruit broadly ovoid or ovoid-globular, ribs keeled, subcircular in cross section; oil tubes faintly visible, 1 per vallecule, 2 toward commissure; albumen flat or slightly notched toward commissure. Annual herbs, without involucre or with involucels with 3 oblong-linear acuminate secund leaflets. (Easily distinguished from other Umbelliferae by their involucel.)

Monotypic genus widespread in Europe, Asia Minor and the Caucasus.

- 539 1. *A. cynapium* L. Sp. pl. (1753) 256; Ldb. Fl. Ross. II, 270; Boiss. Fl. or. II, 961; Shmal'g., Fl. I, 401. — *Ae. Cicuta* Necker, Delic. Gallo-Belg. (1768) 146. — *Ae. toxicaria* Salisb. Prodr. (1796) 166. — *Ae. cynapioides* M. B. Fl. taur.-cauc. I (1808) 227; III, 233; Ldb. Fl. Ross. II, 270. — *Ae. elata* Fridl. ex Fisch. Cat. Hort. Gorenk. (1812) 45, nom. nud.; Hoffm. Umbell. (1814) 98; Ldb. Fl. Ross. II, 270. — *Ae. uifolia* Gray, Nat. Arr. Brit. Pl. II (1821) 513. — *Ae. cynica* Dulac, Fl. Haut.-Pyr. (1867) 353. — *Coriandrum Cynapium* Crantz, Stirp. austr. ed. 1, fasc. III (1767) 92. — *Cicuta Cynapium* Targ. Inst. botan. ed. 2 (1802) 227. — *Cynapium Rivini* Rupr. Fl. ingr. (1860) 442. — *Selinum cynapium* E. H. L. Krause in Sturm. Fl. Deutschl. ed. 2, XII (1904) 110. — Ic.: Syreishch., Illyustr. Fl. Mosk. gub. II, 406 (1907). — Exs.: G. R. F. No. 1520; Pl. Finnl. exs. Nos. 303, 834; Fl. polon. exs. No. 533; Herb. Fl. ingr. No. 262.

Biennials or annuals; root thin, fusiform; stems usually single, 30–100 cm high, faintly ribbed, hollow, branching, like leaves glabrous; leaves bi- or tripinnate, dark green, very shiny beneath when fresh; leaflets triangular or ovate, deeply cut or parted; lower leaves on petioles, the upper sessile on dilated sheath. Umbels opposite leaves, long-peduncled; rays 12–18, unequal, scabrous above; involucre absent or of 1–2 leaflets; involucels asymmetrical, of 3 recurved leaflets with scarios base and margins, nearly twice as long (var. *gigantea* Lej.) or as long as pedicels (var. *cynapioides* (M. B.) Ficin. et Heynh.); petals white or slightly reddish, obcordate, cuneate at base, elongating in peripheral flowers; stylopodium flat-inflated; fruit 2–3 mm long, 2–2.5 mm wide, with arcuate canals toward commissure. June–October.

Weeds, kitchen gardens, gardens, shrubs, felled areas, floodplain forests. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., Balt., U. Dnp., U. V., V.-Don, V.-Kama. M. D., U. Dns., Bes., Bl., L. Don, L. V., Crim.; Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: Centr. Eur., Scand., Atl. Eur., Med., Bal.-As. Min., Arm.-Kurd., N. Am. (introduced). Described from Europe. Type in London.

Economic importance. Essential oil obtained by distillation of the fresh herbs (0.015%) is of no practical significance. In addition there is a negligible amount of an alkaloid close to coniine (0.00023%). Opinions

* From the Greek *aetousa* — shiny (from *aito* — to glitter), referring to the shiny leaves; or from the Greek *aetein* — burn, referring to its burning taste.

differ on the toxicity of the plant. Some regard it as poisonous and dangerous when eaten as a weed (it is sometimes erroneously gathered with 540 parsley), others consider it harmless. There have been very few cases of poisoning of cattle, who usually avoid the plant because of its disagreeable odor.

Genus 1028. **SCHULTZIA*** Spreng.

Spreng. Umbell. Prodr. (1813) 30 et in Schult. Syst. veg. VI (1820) p. XLIV

Calyx teeth inconspicuous; petals white, fruit oblong, compressed laterally, with narrow somewhat protruding ribs and wide valleculae, 3–4 canals under valleculae, 6–8 toward commissure. Style entire. Perennial mountain herbs, with tripinnate leaves; involucre of many pinnatisect leaflets nearly equal to umbel rays. Genus composed of 2 species occurring in eastern mountain ranges of Central Asia, Altai, Sayans and Transbaikalia mountains.

1. Styles erect, ca. 2 mm long, the whole plant always with developed erect stem (Altai and Sayans) 1. *S. crinita* (Pall.) Spreng.
- + Styles divergent, recurved after flowering, ca. 1 mm long; usually acaulescent plant, rarely with developed stem (Central Asia)
. 2. *S. albiflora* (Kar. et Kir.) M. Pop.

1. *S. crinita* (Pall.) Spreng. Plant. Umbell. Prodr. (1813) 30; Ldb. Fl. Ross. II, 258; Turcz. Fl. baic.-dahur. I, 469; Kryl. Fl. Zap. Sil. VIII, 2077.—*Sison crinitum* Pall. in Act. Acad. Petropol. II (1779) 250.—*Sium crinitum* Poir. Encycl. Suppl. I (1810) 622.—*Athamanta crinita* Ldb. Fl. alt. I (1829) 326.—*Carum crinitum* K.-Pol. in Bull. Soc. Nat. Mosc. XXIX (1915) 198.— Ic.: Pall. l. c. tab. 7.

Perennial; root rather thick, its neck covered with dark brown oblong remnants of leaf sheaths; stem erect, 15–45 cm high, furrowed, usually slightly branching, like leaves glabrous; leaves oblong, 6–12 cm long, 1.5–2.5 cm wide, tripinnate, with 2–5 mm long, 0.3–0.5 mm wide with linear or filiform-linear lobules. Umbels 1–3, rarely more, 4–10 cm across, of 15–30 thickish ribbed glabrous rays; leaflets of involucels numerous, nearly as long as umbel rays, bi-tripinnatisect into linear-filiform lobules, slightly expanding at base; leaflets of involucels similar to those of involucre, as long as umbellets; calyx-teeth inconspicuous; petals white, ca. 2 mm 541 long, 1.5 mm wide; fruit 3–3.5 mm long; stylopodium conical; styles erect or slightly divergent, ca. 2 mm long, capitate, 2–3 times as long as stylopodium. July–August. (Plate XXXIV, Figure 10.)

Alpine meadows and moss-lichen alpine tundra, cliffs, sometimes stony mountain taluses in high mountain zone. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau. Gen. distr.: Mong. Described from Altai. Type in London.

* Named after Karl Friedrich Schultz, doctor and botanist from Neubrandenburg, and author of "Prodromus Florae Stargardiensis" (1860).

2. *S. albiflora* (Kar. et Kir.) M. Pop. in Fl. Almaat. gos. zapovedn. (1940) 35.— *Chamaesciadium albiflorum* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV, 2 (1842) 360; Ldb. Fl. Ross. II, 253.— *Ch. albiflorum* Var. *subacaulis* et var. *caulescens* Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 2 (1866) 317.— *Schultzia crinita* auct. plur. Fl. As. med., non Spreng.— Exs.: G. F. S. A. No. 241.

Perennial; entire plant glabrous; root vertical, to 1 cm long, multicipital; stems many, 1–20(30) cm high, creeping or ascending, plant often acaulescent, if so then numerous umbellets borne on long stalks produced from base of stem (var. *subacaulis* (Trautv.) Schischk.), often stem erect, simple or branching in lower part (var. *caulescens* (Trautv.) Schischk.); leaves oblong, their petioles gradually tapering to sheaths with broadly scarious margins, 3–10 cm long, 0.5–2 cm wide, tripinnate; terminal lobules lanceolate-linear or linear, acute, 2–4 mm long, 0.3–0.8 mm wide. Umbels 3–7 cm across, of 15–30 glabrous ribbed rays; leaflets of involucre numerous, bipinnatisect, similar to leaves, nearly as long as umbel rays, slightly broadening at base; umbellets many-flowered, 1–1.5 cm across; leaflets of involucels similar to those of involucre but smaller, as long as umbel rays; fruit oblong-ovoid, ca. 3 mm long, 1 mm wide; stylopodium conical; styles reflexed at flowering, ca. 1 mm long. July–August. (Plate XXXIV, Figure 9.)

Alpine meadows, stony taluses, meadows near upper timberline, moraines, thawing snows, high mountain swampy meadows. — Centr. Asia: Dzu-Tarb., T. Sh., Pam.-Al. (Alai). Gen. distr.: mountains of Chinese Dzungaria. Described from Dzungaria-Ala-Tau, Sarkan River. Type in Moscow, cotype in Leningrad.

Genus 1029. **FOENICULUM*** Mill.

Mill. Gard. Dict. ed. IV (1754). — *Ozodia* Wight et Arn. Prodr. (1834) 375.

542 Calyx-teeth inconspicuous; petals yellow, broadly ovate, broadly notched with inward curved lobe; stylopodium short-conical; fruit ovoid-oblong, circular in cross section; mericarps with 5 distinct obtuse ribs, marginal ribs slightly wider, forming narrow wing-like rims; canals large, 1 per vallecule, 2 (or 4) toward commissure; albumen broad and slightly notched toward commissure; carpophore free, 2-partite nearly to base. Perennial or biennial glabrous plants, with 3–4-pinnatisect leaves and filiform lobules.

Two species, endemic to the Mediterranean area.

1. *F. vulgare* Mill. Gard. Dict. ed. VIII (1758) No. 1; Grossg., Fl. Kavk. III, 169.— *F. capillaceum* Gilib. Fl. lithuan. II (1782) 40.— *F. officinale* All. Fl. Pedem. II (1785) 25; Ldb. Fl. Ross. II, 271; Shmal'g., Fl. I, 400.— *F. foeniculum* Karsten, Fl. Deutschl. II (1895) 462.— *Anethum foeniculum* L. Sp. pl. (1753) 263.— *A. rupestre* Salisb. Prodr. (1796) 168.— *Ligusticum foeniculum* Crantz, Class. Umbell. Emend. (1767) 82.— *Meum foeniculum* Spreng. in Schult. Syst. veg.

* Diminutive of the Latin *foenum* — hay.



PLATE XXXV. 1 — *Silaus popovii* Korov.; 2 — *S. rubtzovii* Schischk.

VI (1820) 433. — *Ozodia foeniculacea* Wight et Arn. Prodr. (1834) 375. — *Selinum foeniculum* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 115. — Ic.: Kom., Sbor., sushka i razved. lekarstv. rast. ed. 3, Table 71 (1917).

Perennial or biennial; root fusiform, to 1 cm thick, branching above, multicapital; stem erect, 90–200 cm high, cylindrical, finely ribbed, strongly branching; leaves ovate-triangular, 3–4-pinnatisect, lower leaves on petioles, the upper sessile on dilated sheath; lobules linear-filiform or linear-subulate, acuminate, slightly cartilaginous; sheaths of leaves 3–6 cm long, narrowly oblong, with scarious margins, slightly broadening toward hood-shaped apex. Umbels 3–15 cm across, of 3–20(25) unequal glabrous rays; involucre and involucels absent; petals broadly ovate, yellow, ca. 1 mm long, nearly as wide; fruit ovoid-oblong, 5–10 mm long, 2–3 mm wide. July–August.

Dry slopes, roadsides and near dwellings, often cultivated, locally escaped. — European part: Crim.; Caucasus: Cisc., Dag., E. and W. Transc., Tal.; Centr. Asia: Mtn. Turkm., Pam.-Al. Gen. distr.: Atl. and Centr. Eur., Med., Bal.-As. Min., Iran., N. and S. Afr., introduced into N. and S. Am., Jap.-Ch. Described from S. Europe. Type in London.

- 545 **Economic importance.** The cultivation of fennel as a vegetable, medicinal plant and an article of food dates back to antiquity (see references in Theophrastus and Dioscorides). It is also grown for the essential oil of its fruits which is extracted by stem distillation of the crushed fruits. The yield of the colorless or slightly yellowish oil, with a typical aroma, and a taste which is bitter at first, later turning sweet, ranges from 4–6%. Its main ingredient is anethole ($C_{10}H_{12}O$). Many varieties of fennel oil are known, such as the common, Florence, Saxon, Indian, etc. Fennel oil is used in the manufacture of soap in the preparations of some medicines, and as a source of anethole. In the USSR it is grown in the Ukraine, Crimea and Caucasus.

Genus 1030. **SILAUS*** Bernh.

Bernh. Syst. Verzeichn. Erf. (1800) 116. — *Silaum* Mill. Dict. (1754) nee Ludw. (1737)

Calyx-teeth inconspicuous; petals yellowish-greenish or pale yellow, obovate, abruptly tapering to broad inward turned lobe; stylopodium short-conical; styles short, reflexed; fruit oblong-ovoid, subcircular in cross section; mericarps with 5 equal pterygoid primary ribs; canals small, numerous, irregularly disposed, obliterated in ripe fruit; albumen nearly flat toward commissure; carpophore free, 2-partite. Perennial glabrous herbs, with tripinnatisect leaves.

Five species, in C. and E. Europe and Central Asia.

* Pliny's name for an unknown plant; possibly from the Greek *selas* — luster, referring to the lustrous leaves.

1. Involucre and involucels none, umbels of 3–7 rays. 4. *S. popovii* Korov.
- + Involucels always present, sometimes also involucre, umbels of 10–25 rays 2.
2. Involucre and involucels present 3. *S. rubtzovii* Schischk.
- + Involucre none 3.
3. Umbels of 10–20 rays, leaf lobules 1–3 cm long, 1–3 mm wide 1. *S. besseri* DC.
- + Umbels of 6–10 rays, leaf lobules narrower, sublinear, 0.5–1 mm wide 2. *S. pratensis* (Crantz) Bess.

546 1. *S. besseri* DC. Prodr. IV (1830) 161; Ldb. Fl. Ross. II, 287; Shmal'g., Fl. I, 400.—*Silaus alpestris* Bess. in Schult. Syst. VI (1820) p. XXXVI, nom.; Enum. pl. Volhyn. (1822) 43, non *Peucedanum alpestre* L.—*Silaum alpestre* Thell. in Hegi, Illustr. Fl. Mitteleur. V, 2 (1926) 1295; Kryl., Fl. Zap. Sib. VIII, 2017.—*S. besseri* Grossh. Fl. Kavk. III, 170.—*Peucedanum silaus* M. B. Fl. taur.-cauc. I (1808) 215, non Lam.—*P. alpestre* Spreng. Sp. Umbell. (1818) 56, non L.—*Cnidium Silaus* M. B. Fl. taur.-cauc. III (1819) 212.—*Ligusticum alpestre* Calestani in Webbia (1905) 122.—Ic.: Nov. Act. Acad. Nat. Cur. XII, 1, tab. II (1829).—Exs.: G. R. F. No. 2644.

Perennial; glabrous; root 5–15 mm thick, its neck densely covered with dark brown remnants of petioles; stem finely furrowed, 50–120 cm high, branching in upper part, slightly geniculate-curved at nodes; leaves triangular, their blade 15–25 cm long, 12–20 cm wide, in lower leaves the blade tripinnate; primary and secondary lobes petioluled, the tertiary deeply cut into 1–3 cm long, 1–2 mm wide linear, acute, scabrous-crenate lobules; upper leaves smaller, less deeply dissected, their short petioles expanded to sheath. Umbels of 10–25 glabrous or slightly scabrous rays; involucre none; involucels of numerous linear-lanceolate leaflets much shorter than pedicels; calyx-teeth inconspicuous; petals pale yellow, oblong-ovate, notched, ca. 1 mm long; fruit oblong-ovoid, with equal, strongly protruding acute ribs, 5 mm long, 2.5 mm wide. July–August.

Solonetzic meadows, solonchaks, damp forests, fruit orchards.—European part: M.D., V.-Kama, V. Don, L. Don, Transv., Bl., Bes., U. Dns.; Caucasus: Cisc.; W. Siberia: Irt.; Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Centr. Eur., Bal. (?). Described from S. Podolia. Type in Geneva.

Note. The combination *S. alpestre* (L.) Bess. is unacceptable because in his description of *Peucedanum alpestre*, Linnaeus failed to cite its country of origin. Similarly, there is no assurance that when describing *Meum sibiricum* (Pugill. II (1815) 156) Sprengel had in mind the Russian plant, since the description is very brief, and we did not see specimens.

2. *S. pratensis* (Crantz) Bess. in Schult. Syst. VI (1820) p. XXXVI; Ldb. Fl. Ross. II, 287; Shmal'g. Fl. I, 400.—*S. flavescens* Bernh. Syst. Verz. Erf. (1800) 177.—*S. selinoides* Halacsy in A. Kern. Sched. Fl. austro-hung. IV (1886) 37.—*S. silaus* Karst. Deutsche Fl. Pharm.-med. Bot. (1880–1883) 337.—*Peucedanum silaus* L. Sp. pl. (1753) 246.—*P. pratense* Lam. Fl. Fr. III (1778) 469.—*P. trilobatum* Gilib. Fl. lithuan. II (1782) 14.—*Seseli selinoides* Jacq. Enum. Vindob. (1762)

547 227. — *S. pratense* Crantz, Stirp. Austr. III (1767) 96. — *Ligusticum* Silaus Vill. Prosp. (1779) 25. — *L. tripartitum* Dumort. Fl. belg. (1827) 79. — *Sium* Silaus Roth, Tent. Fl. Germ. i (1788) 129. — *Crithmum silaus* Wibel, Prim. Fl. Werth. (1799) 197. — *Cnidium silaus* Spreng. Pl. Umbell. Prodr. (1813) 40. — *C. pratense* Bubani, Fl. Pyren. II (1900) 381. — *Silaum silaus* Schinz et Thell. in Vierteljahr. Nat. Ges. Zürich, LX (1915) 359. — *Ic. : Hegi, III. Fl. V, 3, f. 2489.*

Perennial; entire plant glabrous; root vertical, 0.6–0.8 mm thick; stem 40–70 cm high, erect, finely ribbed, with obliquely antrorse branches from middle or nearly from base; radical and lower cauline leaves triangular or ovate, long-petioled, their blade 7–20 cm long, 6–10 mm wide, tripinnatisect into 1–2.5 cm long, 2–4 mm wide, lanceolate, acute lobules with glabrous margins; upper leaves smaller, less dissected. Umbels 2.5–4 cm across, or 6–10 smooth unequal rays; involucre none or of 1–2 early deciduous leaflets; umbellets 8 cm across; involucels of linear-lanceolate acute leaflets with narrow scarious margins, nearly as long as umbel rays; calyx-teeth inconspicuous; petals greenish-yellowish; fruit ovoid, 4 mm long, 2 mm wide, dorsal and marginal ribs winged; stylopodium short-conical; styles recurved, as long as stylopodium. July.

Damp meadows. — European part: reported for Balt., Bes. Gen. distr.: Scand., Centr. and Atl. Eur., Med. (rarely). Described from Austria (vicinity of Linz). Type in Vienna.

Economic importance. The fruits contain 1.4% essential oil, with an aroma reminiscent of tarragon oil.

Note. We did not see any reliable specimens of this species from within the USSR.

3. *S. rubtzovii* Schischk. sp. nov. in Bot. Mat. Gerb. Bot. inst. AN SSSR, XIII (1950) 165.

(548) Perennial; entire plant glabrous; root 0.7 cm thick, its neck covered with dark brown remnants of leaves; stems single or few, erect, thin, simple or with obliquely antrorse branches above; radical leaves few, early withering, on long petioles, their blade oblong or ovate, 3–4.5 cm long, 1.5–2 cm wide, bi- or nearly tripinnatisect; primary lobes sessile, lobules linear, acute, 2–5 mm long, 0.5–1 mm wide; lower cauline leaves also on petioles as long as or longer than blade, abruptly expanding to amplexicaul sheath; upper leaves smaller, sessile on short sheath. Terminal umbels of 10–12 glabrous unequal rays; involucre and involucels of 5 lanceolate-linear unequal acuminate leaflets with scarious margins; umbellets 12–17-flowered, 5–8 mm across; pedicels glabrous; calyx-teeth inconspicuous; petals yellow, ca. 1 mm long, with inward curved tip; tapering to short claw; young fruit broadly ovoid, with protruding ribs; stylopodium pulvinate; styles recurved, as long as stylopodium. July. (Plate XXXV, Figure 2.)

Fine earth slopes, ca. 2,000 m. — Centr. Asia: T. Sh. (Kirghiz Range). Endemic. Described from Kirghiz Range. Type in Leningrad.

4. *S. popovii* Korov. in Byull. Sredneaz. Gos. univ. XV, Suppl. (1927) 52. — Exs.: H. F. A. M. No. 325.

Perennial; entire plant glabrous; root ca. 1.5 mm thick, multicapital, stem base densely covered with brown remnants of leaves; stems many, 35–65 cm high, erect, thin, slightly furrowed, branching above or from middle with obliquely antrorse branches, slightly leafy; radical leaves numerous, triangular, 10–15 cm long, 5–7 cm wide, ternate-pinnate-compound; primary lobes on long petioles, their blade triangular-ovate; secondary lobes sessile or the lowermost on short petiolules, pinnatisect, the sessile lobules of the third order dissected into narrow linear sub-filiform 4 mm long, 0.3 mm wide acute sections; median cauline leaf often solitary, its shortened bipinnate blade sessile on oblong sheath; upper leaves with nearly obsolete blade, reduced to sheath. Umbels 2–4 cm across at flowering, of 3–7 unequal glabrous rays; involucre and involucels none; umbellets 6–11-flowered, with unequal rays, 6–11 mm long; petals yellowish, oval, not notched, inward curved, ca. 1 mm long; fruit (unripe) ovoid-oblong, compressed laterally; mericarps subcircular in cross section, dorsally with 5 filiform ribs; stylopodium short-conical, with undulant margin at base; styles recurved, longer than stylopodium; canals of mesocarp numerous, narrow. June. (Plate XXXV, Figure 1.)

Limestone slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Nura-Tau Range. Type in Tashkent, cotype in Leningrad.

Note. Distinguished from *Silaus* by the less deeply cut leaves (not common to typical members of this genus). Unfortunately, as ripe fruits were not available, the relationship of this plant to *Silaus* could not be definitely determined.

Silaus gracilis Bge. (in Mém. sav. étrang. Acad. Pétersb. VII (1851) 301), described from Central Asia, remains obscure. There are
549 no original specimens in the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR.

Genus 1031. **CNIDIUM*** Cuss.

Cuss. in Mem. soc. med. Par. (1787) 280. — Allinum Neck. Elem. I (1790) 179. — Lithosciadium Turcz. in Bull. Soc. Nat. Mosc. XVII (1844) 730. — Tilingia Rgl. in Nouv. Mém. Soc. Nat. Mosc. XI (1859) 97. — Ligusticum sect. III Cnidium Calestani in Webbia (1905) 211

Calyx-teeth very short or inconspicuous; petals white or reddish, obovate, notched; stylopodium high-turbinate; styles after flowering reflexed, several times as long as stylopodium; fruit ovoid-cylindrical, slightly compressed laterally, subhexagonal in cross section, with thin winged ribs, the lateral hardly longer than the median; canals 1 per vallecule, 2–4 toward commissure; albumen, subpentagonal in cross section, nearly flat toward commissure. Biennial or perennial, rarely annual herbs, with twice or many times pinnate leaves, and lanceolate lobules; involucre present or absent, involucels of many obovate or subulate leaflets.

More than 20 species in Europe and Asia.

* From the Greek *knide* — burning, itching, referring to the very sharp taste of the plant.

1. Stem very short-scabrous-hairy, sometimes visible hairs confined to nodes; annual 10. *C. monnieri* (L.) Cuss.
- + Stem glabrous; perennials, very rarely biennials 2.
2. Involucre of 3–9 oblong or lanceolate leaflets persistent in fruit . . . 3.
- + Involucre absent or of 1–2(4) filiform early deciduous leaflets 5.
3. Involucre of numerous linear-lanceolate herbaceous leaflets or leaflets with scarious margin, often longer than umbellets; stems 10–50 cm high, usually many 2. *C. multicaule* (Turcz.) Ldb.
- + Involucre of obovate, nearly entirely scarious leaflets, shorter than or equal to umbellets; stem 50–100 cm high, usually single 4.
4. Umbel rays glabrous along ribs or with indistinct small tubercles; styles divergent, twice as long as stylopodium 3. *C. cnidiifolium* (Turcz.) Schischk.
- 550 + Umbel rays distinctly unevenly finely tuberculate above; styles recurved, as long as stylopodium 1. *C. dahuricum* (Jacq.) Turcz.
5. Umbels of 6–15 rays 6.
- + Umbels of 16–35 rays 8.
6. Lobules linear, 0.7–2 cm long, 1.5–2 mm wide 5. *C. salinum* Turcz.
- + Lobules ovate or lanceolate-linear, 3–7 mm wide 7.
7. Stem base covered with squamiform brown sheaths, involucels of few narrowly linear leaflets 9. *C. pauciradiatum* Somm. et Lev.
- + Stems without brown sheaths at base, leaflets of involucels lanceolate, numerous 6. *C. ajanense* (Rgl. et Til.) Drude.
8. Lobules lanceolate-linear, entire or 2–3-segmented, 1–2 cm long, 1–3 mm wide 4. *C. dubium* (Schkuhr) Tell.
- + Lobules ovate 9.
9. Leaves triangular-ovate, tripinnate, lobules small, 2–7 mm long, 2–3 mm wide 7. *C. orientale* Boiss.
- + Leaves broadly ovate, bipinnate, lobules 2–2.5 cm long, ca. 1 cm wide 8. *C. grossheimii* Mand.

Series 1. DAURICA Schischk. — Perennials. Involucre of 5–9 oblong or lanceolate persistent leaves, stems glabrous.

1. *C. dahuricum* (Jacq.) Turcz. ex Fisch. et Mey. in Ind. II sem. Horti Petrop. (1835) 33 et in Ann. Sc. nat. sér. 2, V (1836) 188; Ldb. Fl. Ross. II, 284; Turcz. Fl. baic.-dahur. I, 491. — *C. striatum* Turcz. ex Fisch. et Mey. in Ann. Sc. nat. sér. 2, V (1836) 18. — *C. argenteum* Cesati in Linnaea, XI (1837) 324. — *C. cuneatum* Ldb. Fl. alt. I (1829) 331. — *Laserpitium davuricum* Jacq. Hort. Vindob. III (1776) 22. — *Selinum sibiricum* Retz. Obs. II (1779) 16. — *Aulacospermum cuneatum* Ldb. Fl. alt. IV (1833) 335; Fl. Ross. II, 363; Kryl., Fl. Zap. Sib. VIII, 2059. — Ic.: Ldb. Ic. pl. Fl. Ross. IV, tab. 312.

Perennial; root vertical, 0.5–0.8 cm thick above; stem erect, 30–100 cm high, single, slightly branching above, glabrous, scabrous only under inflorescence, finely ribbed, solid; radical leaves on long petioles abruptly dilated into short sheaths, the leaves ovate-triangular, 25 cm long, 12 cm wide, bi- or nearly tripinnatisect; primary lobes

551 short-petioluled, secondary lobes ovate, sessile, 1–3 cm long, 0.5–1.5 cm wide, acutely dentate or pinnatifid, glabrous. Umbels few, 4–8 cm across, the central one on more or less long stalk, the 2 upper lateral umbels usually as long as or overtopping the central umbel, of 14–21 unequal acutely scabrous rays; involucre of 7–9 narrowly ovate or oblong glabrous leaflets with broad scarious-spreading margins, half as long as umbel rays; umbellets ca. 1 cm across; pedicels glabrous; involucels of 5–7 obovate, nearly entirely scarious, short-acuminate glabrous leaflets; fruit ellipsoid, 3.5 mm long, 3 mm wide, with 5 winged ribs of equal width. July–August. (Plate XV, Figure 13; Plate XXXVI, Figure 1.)

Damp, often solonchetic meadows, solonchets, shrubs, forest edges, banks of rivers and edges of marshes. — W. Siberia: Alt. (Kerlyk stream, Topchugan and Taldury rivers); E. Siberia: Ang.-Say., Dau., Lena-Kol. **Gen. distr.:** Jap.-Ch. (Manchuria), Mong. Described after plants grown from seeds collected in Dauria. Type in Vienna.

2. *C. multicaule* (Turcz.) Ldb. Fl. Ross. II (1844) 284. — *Lithosciadium multicaule* Turcz. in Bull. Soc. Nat. Mosc. XI (1858) 93, nomen et in Fl. baic.-dahur. I (1842–1845) 490. — *Carum lutescens* Turcz. pl. exs. a. 1830.

Perennial; root ca. 1 cm thick, its neck densely covered with long dark fibrous brown remnants of leaves; stems many, 10–50 cm high, ascending or erect, simple or branching, like leaves glabrous; radical leaves numerous, long-petioled, their blade broadly ovate, 8–12 cm long, 3–4 cm wide; primary lobes petioluled, the secondary 0.7–2 cm long, 0.5–1 cm wide, sessile, broadly ovate, incised-dentate, their teeth with short cusp. Umbels of 7–18 glabrous rays not elongating in fruit; involucel of 5–7 unequal lanceolate-linear leaflets with scarious margins; umbellets 1.5 cm across; involucels usually longer than umbellets of numerous linear-lanceolate broadly scarious leaflets connate at base; petals greenish, sometimes violet; fruit ovoid, 6 mm long, 3 mm wide, the dorsal ribs narrowly winged, marginal ribs broader; canals single under valliculae, broad, extending all across space between ribs, 2 large canals toward commissure approach the median line of the fruit and reach its base. July. (Plate XXXIV, Figure 13.)

552 Gravels and stony taluses, to 2,140 m. — E. Siberia: Ang.-Say., Dau. **Gen. distr.:** Mongolia. Described from Nukha-Daban and Lake Khubsugul. Type in Leningrad.

3. *C. cnidiifolium* (Turcz.) Schischk. comb. nov. — *Selinum cnidiifolium* Turcz. in Bull. Soc. Nat. Mosc. XIII (1840) 72; Ldb. Fl. Ross. II, 293. — *S. dawsonii* Coult. et Rose, Bot. Gaz. XIII (1888) 144. — *Conioselinum dawsonii* Coult. et Rose, Contr. U. S. Nat. Herb. VII (1900) 52. — *C. cnidiifolium* Porsild in Rhodora, XLI (1939) 267.

Perennial; entire plant glabrous; stem 25–80 cm high, simple or branching in upper half, deeply furrowed; leaves green, triangular-ovate or ovate-oblong, the radical and lower cauline leaves on long petioles, 5–30 cm long, abruptly dilated to sheath, their blade 3–4-pinnatisect, 10–25 cm long, 5–25 cm wide; lobes of the third order ovate, deeply pinnatisect into lanceolate acute lobules with smooth margins, lobules of

the last order 3–7 mm long, 1–2 mm wide; upper cauline leaves smaller, less dissected, subsessile. Umbels terminating stem and branches, 4–12 cm across, of 9–18 furrowed glabrous rays; involucre of 5 lanceolate scarious long-acuminate early deciduous leaflets, 5.15 mm long; involucre of 9–11 lanceolate acuminate, broadly scarious leaflets with smooth margins as long as pedicels; calyx-teeth inconspicuous; petals white or violet, ca. 2 mm long; stylopodium short-conical, with unevenly notched margin; styles divergent, slightly longer than stylopodium; fruit broadly ovoid, 4.5–5 mm long, 3.5 mm wide; mericarps with 5 winged ribs. Fl. June–July, Fr. August. (Plate XXXIV, Figure 11.)

Herbaceous slopes, sandy slopes, swampy meadows, gravels in river floodplains, willow stands inside and along edges of broadleaved forests. – Arctic: AN., Chuk.; E. Siberia: Dau., Lena-Kol.; Far East: Okhot. **Gen. distr.:** Bering (Mackenzie, Yukon, Alaska). Described after specimens collected between Yakutsk and Aldan. Type in Leningrad.

Series 2. *Dubia* Schischk. – Perennials, rarely biennials. Involucre none or of 1–3 filiform, early deciduous leaflets, stem glabrous.

4. *C. dubium* (Schkuhr) Thell. in Hegl, *Illustr. Fl. Mitteleur.* V. 2 (1926) 1305; Kryl., *Fl. Zap. Sib.* VIII, 2015. – *C. venosum* Koch. Umbellif. (1824) 109; Ldb. *Fl. Ross.* II, 283; Shmal'g., *Fl.* 1, 401. – *C. palustre* Rchb. *Fl. Germ. excurs.* (1832) 463. – *Seseli dubium* 553 Schkuhr. *Handb.* I (1791) 217. – *S. venosum* Hoffm. *Fl. Germ.* III (1800) 44. – *S. selinoides* Bess. *Cat. Hort. Cremen.* (1816) 130, nec Jacq. (1762). – ? *Selinum pelustre* L. *Sp. pl.* (1753) 254, p. p. – *S. lineare* Schumacher, *Enum. pl. Saelland.* I (1801) 95. – *S. pratense* Spreng. *Fl. Hal.* (1806) 92. – *S. turfosum* Baumg. *Enum. Stirp. Transs.* I (1816) 223. – *Meum venosum* Baill. *Hist. Pl.* VII (1880) 191. – *Ligusticum venosum* Calest. in Webbia, I (1905) 211. – *Ic.:* Syreishch., *Ill. Fl. Mosk. gub.* II, 408. – *Exs.:* G. R. F. No. 1617; *Fl. Finl. exs.* No. 304.

Perennial or biennial; root fusiform, sometimes with shoots from its neck; stem 30–80 cm high, single, erect, cylindrical below, finely sulcate in upper part, glabrous, simple or slightly branching above; leaves oblong-ovate, bi- or nearly tripinnatisect, lower leaves with long petioles tapering to short sheath, upper leaves on short sheaths; blade 5–15 cm long, 3–6 cm wide; lobes of the last order linear or lanceolate-linear, entire or 2–3-lobed, 1–2 cm long, 1–3 mm wide, acute or obtuse, mucronate, slightly revolute or thinly crenate-dentate; leaf sheaths often purple. Umbels 5–7 cm across, of 20–35 slightly scabrous or glabrous rays; involucre none or of several subulate scabrous leaflets half the length of the rays; umbellets 10–15 mm across; leaflets of involucels numerous, linear-subulate, nearly as long as pedicels or longer (var. *ferulaceum* (DC.) Thell.); petals elliptic or ovate, 0.75–1 mm long; fruit broadly ovoid or subglobular, 2–2.5 mm long, 1.5–2 mm across, with 5 rather broad winged ribs; stylopodium short-conical; styles long, much longer than stylopodium, in fruit recurved, nearly as long as fruit. July–August.

Mixed, birch, birch-aspen forests, pine forests, dry valley and damp, sometimes solonetzic meadows, meadow steppes. — European part: throughout European part of USSR except for the Arctic, Crim. and L. V. (much more rare in the south); W. Siberia: U. Tob., Ob, Irt.; E. Siberia: Ang.-Say. (W.); Centr. Asia: Ar.-Kasp., Balkh. (N.). Gen. distr.: Scand., Centr. Eur. Described from Germany. Type in Berlin.

Note. Owing to its very similar habit, this species is often mistaken for *Seseli annuum* from which it differs by the glabrous stem, the glabrous margins of leaves and petioles and the narrowly linear leaflets of the involuclers without scarious margins.

5. *C. salinum* Turcz. in Bull. Soc. Nat. Mosc. XVII (1844) 733. — *C. venosum* Ldb. Fl. ross. II, 283, non Koch. — *Ligusticum salinum* K.-Pol. in Bull. Soc. Nat. Mosc. XXIX (1915) 118.

554 Perennial or biennial; root rather thick, 3–6 mm across, vertical or obliquely ascending; stem 50–70 cm high, single, erect or geniculately curved, finely furrowed, slightly branching in upper half, glabrous; leaves ovate-oblong or broadly ovate, bi- or nearly tripinnatisect; lower leaves with petioles as long as or longer than blade, often violet, dilated to short sheath, their blade 3–20 cm long, 3–10 cm wide; lobules linear, 5–20 mm long, 1.5–2 mm wide, acute, with slightly revolute margins, smooth; upper leaves smaller, less dissected, sessile on dilated sheath. Umbels 3–6 cm across, of 6–12 unequal furrowed rays slightly scabrous inside; involucre none or of 1 subulate leaflet; umbellets 0.6–1 cm across; leaflets of involuclers 2–6, linear-subulate, longer than pedicels; petals white, broadly ovate, notched, 0.75–1.2 mm long; stylopodium short-conical; styles reflexed, slightly longer than stylopodium; fruit ovoid, 2.5–3 mm long, 1.5 mm wide, with slightly winged ribs. June–July.

Solonetzic, often damp meadows, wet solonetz, rock debris and sandy shores. — E. Siberia: Ang.-Say., Dau. Gen. distr.: Jap.-Ch. (Manchuria). Described from solonchaks of Dauria and Selenga. Type in Leningrad.

Note. Very much like *Peucedanum falcaria* Turcz., but with strongly scabrous umbel rays.

6. *C. ajanense* (Rgl. et Til.) Drude in E. — P. Nat. Pflanzenfam. III, 8 (1898) 210; Kom., Fl. Kamch. II, 341. — *C. tilingia* Takeda in Bot. Mag. Tokyo, XX (1906) 305. — *Tilingia ajanensis* Rgl. et Til. Fl. Ajan. (1858) 97. — *Selinum tilingia* Maxim. in Bull. Ac. Sc. St.-Petersb. XXXI (1886) 50. — *Ligusticum ajanense* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXIX (1915) 120. — Ic.: Hulten, Fl. of Kamtch. III, p. 162, f. 16, b, c; Samoku-Dzusetsu, Ed. Makino, V, tab. 17 (1907).

557 Perennial; root rather thick, vertical; stem single or few, usually erect, 15–50 cm high, glabrous, finely ribbed, simple or with few oblique antrorse branches above; leaves nearly all radical, ovate-triangular or ovate-oblong, bi- or nearly tripinnatisect, their petioles longer or shorter than blade, dilating to short, scarious, sometimes violet sheath; blade green above, paler beneath, 4–8 cm long, 3–6 cm wide; lower pair of primary lobes on more or less long, the median on short and the upper on sessile petiolules; lobes of the last order ovate, ovate-linear, 2–7 mm wide, pinnatifid into linear or ovate-lanceolate acute lobules. Umbels 3–4 cm across, the 5–12



PLATE XXXVI. 1 — *Cnidium dahuricum* (Jacq.) Turcz. 2 — *C. ajanense* (Rgl. et Til.) Drude.

rays scabrous above; involucre none or of 1–4 lanceolate-linear, often scarious leaflets; umbellets 5–9 mm across; leaflets of involucre narrowly lanceolate, long-acuminate, usually scarious, shorter than, or as long as or longer than pedicels; calyx-teeth conspicuous; petals elliptic, white or violet, with inward curved lanceolate-attenuate tip; fruit broadly ovoid, shiny, 3–5 mm long, 2–2.5 mm wide, with 3 winged dorsal ribs 2 lateral ribs slightly broader; canals 2–3 per vallecule, 4–6 toward commissure; stylopodium short-conical; styles recurved, 2–3 times as long as stylopodium. Fl. July–August; Fr. September. (Plate XXXIV, Figure 12; Plate XXXVI, Figure 2.)

Shrubs, alpine meadows, hummocky tundra, damp meadows, edges of swamps, forb-sedge meadows. — Arctic: Chuk., An.; E. Siberia: Dau., Lena-Kol. (Aldan Plateau, Dzhusdzhur Range); Far East: Okh., Uda, Kamch., Sakhal., Ze.-Bur. Gen. distr.: Bering. Described from Ayan. Type in Leningrad.

7. *C. orientale* Boiss. in Ann. Sc. Nat. III, 1 (1844) 299; Boiss. Fl. or. II, 971; Grossg., Fl. Kavk. III, 171. — *Selinum orientale* Benth. et Hook. Gen. I (1862–1867) 914. — *C. silaifolium* var. *orientale* Halacsy, Consp. fl. Gr. (1901) 648.

Perennial; root thick; stem single, 30–40 cm high, slightly curved at nodes, cylindrical below, glabrous, furrowed in upper part, with some obliquely antrorse branches above; leaves triangular-ovate, tripinnate, lower and radical leaves with petioles as long as or shorter than blade, in upper leaves blade abruptly passing to more or less long sheath; blade of radical leaves 8–12 cm long, 4–10 cm wide; lobules ovate, mucronate, 2–7 mm long, 2–3 mm wide, with revolute margins. Umbels 3–7 cm across, of 16–25 furrowed rays slightly scabrous above; involucre of 2–3 linear-filiform leaflets or none; umbellets ca. 1 cm across; leaflets of involucre 3–7, usually shorter than pedicels; petals elliptic, entire or notched, ca. 1 mm long, white; stylopodium short-conical; styles eventually reflexed; fruit broadly ovoid. July.

558 Stony slopes. — Not found in the USSR. Occurring near borders of former Artvin district. Gen. distr.: Bal.-As. Min., Arm.-Kurd. Described from Rumelia and Asia Minor. Type in Geneva.

8. *C. grossheimii* Mand. in Bot. mat. Gerb. Bot. Inst. im. V. L. Komarov AN SSSR, XII (1950) 171.

Perennial; rhizome horizontal or ascending, 0.8–1.5 cm thick; stem erect, ca. 100 cm high, simple or slightly branching, like leaves glabrous, striated lengthwise, hollow; radical leaves with 20–30 mm long petioles, their blade broadly ovate, 12–20 cm long, bipinnate, with 4–5 pairs of primary petioluled lobes pinnatisect into ovate 2–2.5 cm long, ca. 1 cm wide strongly and unequally toothed, lobes of the second order; lower cauline leaves similar to the radical, the upper smaller, nearly simple-pinnate, sessile on dilated sheath. Umbels 5–6 cm across, of 25–40 rays acutely scabrous above, compressed in fruit; involucre of 7–11 linear, early deciduous leaflets, 8–10 mm long, 1 mm wide, appressed to umbel rays; umbellets ca. 1 cm across; involucre of 7–11 narrowly linear unequal leaflets; petals white, ca. 1 mm long, slightly notched; stylopodium conical; styles reflexed, longer than stylopodium; fruit unripe with 5 equal ribs. July.

Subalpine meadows, shrubby thickets along edges of mixed spruce-beech forests. — Caucasus: E. Transc. (Bakuriani). Endemic. Described from Bakuriani. Type in Tbilisi, cotype in Leningrad.

9. *C. pauciradiatum* Somm. et Lev. in Nuovo Giorn. bot. ital. (1895) 76; Tr. Bot. Sada. XVI (1900) 187; Grossg., Fl. Kavk. III, 271. — *Ligusticum pauciradiatum* K. - Pol. in Bull. Soc. Nat. Mosc. n. s. XXIX (1915) 210. — Ic.: Somm. et Lev. in Tr. Bot. Sada, Table XIX.

559 Perennial; entire plant glabrous, green; rhizome ascending, thin; stems thin, ca. 50 cm high, cylindrical, faintly furrowed, slightly branching, their base covered with brown squamiform sheaths; radical and lower cauline leaves with long petioles dilated to short narrow sheath, their blade broadly ovate or subtriangular, tripinnatisect, 6–7 cm long; lobes of the last order lanceolate-linear, with short mucro. Umbels of 8–15 rays scabrous above; involucre none or of 1–2 linear-shield-shaped leaflets; involucels of few narrowly linear leaflets as long as umbellets at flowering; calyx-teeth inconspicuous; petals white, pinkish outside, obcordate, deeply notched, with long inward curved tip; fruit ovoid-oblong; ribs 5, nearly winged, laterally ribs wider; canals 1 per vallecule; stylopodium short-conical; styles reflexed, longer than stylopodium. Fl. July, Fr. August.

Subalpine meadows; Caucasus: W. and E. Transc. Endemic. Described from Klukhori Pass, 2,300 m. (Abkhazia) and from Didilyakhva River (S. Osetia). Type in Florence.

Series 3. *Annuae* Schischk. — Annuals, stem short-scabrous-hairy.

10. *C. monnieri* (L.) Cuss. in Mém. Soc. Med. Par. (1782) 280; DC. Prodr. IV, 152; Ldb. Fl. Ross. II, 283; Turcz. Fl. baic.-dahur. I, 491. — *C. microcarpum* Turcz. ex Bess. in Beibl. zur Flora, I (1834) 13, nom. nud. — *Athamanta chinensis* L. Sp. pl. (1753) 245, non Cn. chinense Spreng. (1841). — *Selinum monnieri* L. Amoen. Acad. IV (1755) 269. — *Ligusticum minus* Lam. Fl. Fr. III (1778) 454. — *Cicuta sinensis* Zucc. in Roem. Collect. I (1809) 135. — Ic.: Kom. and Alis., Oprod. rast. Dal'nevost. kr. II, Figure 246 (1932).

Annual; root vertical, 2–3 mm thick, narrowly fusiform; stem single or few, usually erect, 20–80 cm high, short-scabrous-hairy below, glabrous above, densely white-haired only under inflorescence, ribbed, hollow, branching; leaves ovate, bi- or nearly tripinnatisect; radical and lower cauline leaves with petioles as long as blade, dilated to whitish amplexicaul sheath; blade 3–8 cm long, 1.5–5 cm wide; lobules 2–15 mm long, 1–2.5 mm wide entire linear or narrowly lanceolate, acute or with whitish cartilaginous mucro. Umbels 2–5 cm across, of 15–30 rays scabrous above; involucre of numerous linear-subulate, finely acuminate, slightly dilated leaflets $\frac{1}{3}$ the length of the umbel rays; umbellets small, 5–10 mm across, with glabrous rays; leaflets of involucels 5–9, linear-subulate or linear-lanceolate, with very finely ciliate margin, as long as pedicels; petals elliptic, white, hardly notched, with very short inward curved tip, ca. 1 mm long; fruit broadly ovoid, 2.5 mm long, 1.5 mm wide, with 5 rather broad winged ribs. — June–July.

Damp inundated or solonchek meadows, shores of lakes and rivers, weeds of fields. — E. Siberia: Ang.-Say. (?), Dau., Lena-Kol. (Ust-Aldan region); Far East: Uss. **Gen. distr.:** Jap.-Ch. Introduced in S. Europe and the Balkans, locally escaped from botanical gardens. Described from S. France. Type in London.

Genus 1032. **SELINUM*** L.

L. Sp. pl. ed. 2 (1762) 350, p. p. — Ligusticum sect. V. *Selinum* Calestani in Webbia, I (1905) 211. — *Thysselinum* Adans. Fam. II (1763) 100, nec Moench (1794), nec Hoffm. (1814). — *Carvifolia* Vill. Hist. Pl. Dauph. II (1786–1787) 629. — *Allinum* Neck. Elem. I (1790) 179, p. p. — *Carvi* Bernh. Syst. Verzeichn. Erf. (1800) 114, nec Bubani. — *Mylinum* Gaud. Fl. Helv. II (1828) 344.

Calyx-teeth inconspicuous, petals white or yellowish, broadly ovate, notched with inward curved lobe, stylopodium short-conical, styles elongate, eventually reflexed, fruit oblong-ovoid, mericarps with 5 pterygoid ribs, marginal ribs nearly twice as wide as the dorsal, canals single under valliculae, 2–4 toward commissure, albumen nearly flat toward commissure. Perennials, with numerous pinnatisect leaves.

Four species in Europe and Central Asia.

1. Involucre none or of 1–2 early deciduous leaflets. 2.
- + Involucre of 5–9 persistent leaflets 3.
2. Umbels of 15–20 rays scabrous-hairy above 1. *S. carvifolia* L.
- + Umbels of 8–12 glabrous rays 2. *S. kultiassovii* Korov.
3. Leaves bi- or triternate, primary and secondary lobes on long petiolules; umbels of 6–11 rays 3. *S. tianschanicum* Korov.
- + Leaves simple-pinnate, with sessile leaflets; umbels of 10–18 rays 4. *S. popovii* (Korov.) Schischk.

1. *S. carvifolia* L. Sp. pl. ed. 2 (1762) 350; Ldb. Fl. Ross. II, 292; Shmal'g., Fl. I, 403; Kryl., Fl. Alt. VIII, 2016. — *S. palustre* Crantz, Stirp. Austr. ed. 1, III (1767) 39, non L. — *S. pseudo-carvifolia* Crantz, I. c. (1767). — *S. carvifolia* linnaei Jacq. Fl. Austr. I (1773) 13. — *S. angulatum* Lam. Fl. Fr. III (1778) 415. — *S. acutangulum* Gilib. Fl. lithuan. II (1782) 22. — *S. tenuifolium* Salisb. Prodr. (1796) 162. — *Seseli carvifolia* L. Sp. pl. (1753) 260. — *Laserpitium selinoides* Scop. Fl. carn. ed. 2, I (1772) 198, non Crantz (1767) nec Miller (1768). — *Angelica carvifolia* VIII. Prosp. (1779) 25. — *Athamanta carvifolia* Web. in Wigg. Prim. Fl. Holsat. (1780) 27. — *Mylinum carvifolia* Gaud. Fl. Alvet. II (1828) 344. — *Carum sulcatum* Steud. Nomencl. ed. 1 (1840) 164. — *Ligusticum carvifolia* Car. in Parl. Fl. Ital. VIII (1889) 239. — Ic.: Jacq. Fl. Austr. I, tab. 16; Rchb. Ic. Fl. Germ. XXI, tab. 101. — Exs.: G. R. F. No. 565.

* From the Greek *selinon* — an ancient name for an umbellifer the leaves of which were used to make wreaths, from the Greek *selas* — luster (lustrous leaves), alternately from *helisso* — twisting, winding, referring to the above-mentioned use of the leaves.

Perennial; entire plant glabrous; stem 30–90 cm high, simple or branching above, deeply furrowed, with acute narrowly winged ribs; leaves green, triangular to ovate-oblong; radical and lower cauline leaves with 5–15 cm long petioles on short sheaths, their blade 3–4-pinnatisect, 10–15 cm long, 5–10 cm wide; lobes of the last order ovate, deeply pinnatipartite or pinnatisect into lanceolate usually mucronate finely crenate, 3–6 mm long, 1.5–2.5 mm wide lobules; upper cauline leaves smaller, less dissected, usually only bipinnate, sessile. Umbels terminal, 5–7 cm across, of 15–20 sulcate rays hairy above; involucre none or of 1–2 inconspicuous, early deciduous leaflets; umbellets many-flowered; involucels of many linear leaflets longer than pedicels; with narrow white-scarious ciliate-crenate margin; calyx-teeth inconspicuous; petals white or reddish, elliptic, ca. 1.5 mm long, to 1 mm wide, tapering to short claw, narrowly notched; fruit broadly elliptic, 2.5–4 mm long, 2–3.5 mm wide. Fl. June–August, Fr. September. (Plate XXXIV, Figure 14.)

Herbaceous coastal forests, willow stands, beech forests, forest edges, shrubs, meadows. — European part: Kar.-Lap., Lad.-Ilm., Balt., V.-Kama, U. V., U. Dnp. M. D., V.-Don, Transv., Bl. L. Don, U. Dns., Bes.; W. Siberia: Ob (Borovyanskii pine forest massif). Gen. distr.: Scand., Centr. Eur., Bal., introduced in N. Am. Described from Siberia (Ob River) and Germany. Type in London.

2. *S. kultiassovii* Korov. in Addenda XV, 438.

Perennial; entire plant glabrous; stem cylindrical, finely ribbed, ca. 70 cm high, glabrous, slightly branching above; radical leaves with 10–15 cm long petioles, their blade ovate or oblong-ovate, 10–12 cm long, 6–8 cm wide, bipinnate, primary lobes short-petioluled, lobes of the second order 2–3 cm long, 1–1.5 cm wide, sessile, ovate, irregularly toothed; lower cauline leaves similar to the radical, the upper smaller, less deeply
562 dissected. Umbels ca. 4 cm across, of 8–13 glabrous unequal rays; involucre none; umbellets 0.8 cm across; involucels of 3–5 linear acuminate leaflets shorter than umbellet rays; calyx-teeth triangular, acute; petals whitish, ca. 1 mm long, notched, with inward curved tip; young fruit ovoid; stylopodium short-conical, with undulant base; styles reflexed, $1\frac{1}{2}$ times as long as stylopodium; ripe fruit unknown. August.

Damp meadows. — Centr. Asia: T. Sh. (Talass Ala-Tau Range). Endemic. Described from Dzhebogly-Su River. Type in Leningrad.

3. *S. tianschanicum* Korov. in Bot. mat. Gerb. Gl. Bot. Sada. V (1924) 76. — *S. coriaceum* Korov., Ibid. (1924) 77. — *S. tenuisectum* Korov. in Sistem. zam. Gerb. Inst. bot. i zool. UzSSR, VIII (1947) 14. — Exs.: H. F. A. M. No. 242.

Perennial; root thick, 1–2 cm across, branching above, its neck covered with dark brown fibrous remnants of leaves; stems few or many, finely furrowed, glabrous, 40–100 cm high, branching from middle or nearly from base; radical leaves numerous, ovate-triangular, twice or thrice ternate-dissected, their petioles nearly as long as blade, dilated sheath; primary and secondary lobes long-petioluled; lobes of last order ovate-rhombic, ovate or lanceolate-linear, 1–3.5 cm long, 0.3–2.5 cm wide, with short mucro; cauline leaves similar to the radical but smaller, uppermost leaves

with reduced blade. Umbels terminating stem and branches, 3–7 cm across, of 6–11 smooth rays; involucre of 5–9 linear-subulate straight hardly scabrous leaflets much shorter than umbel rays; umbellets few-flowered (10–12), 5–6 mm across, with scabrous-hairy rays; involucels of 4–7 lanceolate-linear acuminate short-scabrous-hairy leaflets shorter than pedicels; calyx-teeth very small, triangular; petals greenish-whitish, dorsally hardly pubescent, obscurely notched, ca. 1 mm long and as wide; ovary very short-scabrous or subglabrous; fruit oblong, 6–8 mm long, 3–4 mm wide, slightly compressed dorsally; stylopodium flat-pulvinate at first, becoming short-conical in fruit; styles longer than stylopodium, reflexed; mericarps with 5 protruding acute whitish ribs; albumen deeply notched toward commissure. July – August.

Stony and meadow slopes, dry river beds, Central Asian juniper woodlands. — Centr. Asia: T. Sh. (W.). Endemic. Described from the Ugama River valley. Type in Tashkent, cotype in Leningrad.

563 4. *S. popovii* (Korov.) Schischk. comb. nov. — *Trachydium popovii* Korov. in Bot. mat. Gerb. Gl. Bot. Sada. V (1924) 78.

Perennial; root to 1 cm thick, its neck densely covered with dark brown remnants of petioles; stem 60–70 cm high, cylindrical-angular, furrowed, densely leafy, with obliquely antrorse branches nearly from base, branches approached, nearly whorled above, forming paniculate inflorescence; radical leaves numerous, with flattened dilated petioles, 10–20 cm long, their blade broadly ovate, 5–10 cm long, 4–6 cm wide, simple-pinnate, their lobes (5) ovate, sessile, decurrent on general petiole, with triangular-ovate acute teeth; cauline leaves smaller, tripartite or trisect, uppermost leaves entire, lanceolate, acute or dentate, attenuate at base. Umbels numerous, 5–7 cm across, both terminal and lateral of 10–18 glabrous rays; involucre of 8 lanceolate acute herbaceous reflexed, 10–20 mm long, 3–3.5 mm wide leaflets; umbellets 15–20-flowered, ca. 1 cm across; involucels of 4 lanceolate, acute reflexed, 3.5–5 mm long, 1.5–1.7 mm wide leaflets, flowers polygamous; calyx-teeth inconspicuous; petals yellowish, 1.2 mm long, short-clawed; stylopodium flat-conical with undulant margin; styles reflexed, slightly longer than stylopodium; fruit oblong, 4 mm long, ca. 1 mm wide, slightly compressed laterally; mericarps with winged ribs; canals 1 per vallecule, 2 toward commissure. Fl. August, Fr. September.

Cliffs. — Centr. Asia: T. Sh. (W.). Endemic. Described from the Ugama River valley. Type in Leningrad.

Genus 1033.* **HYALOLAENA** ** Bge.

Bge. in Mem. Sav. etrang. Acad. Sc. Petersb. VII (1852) 128. — *Holopleura* Rgl. et Schmalh. in Izv. Obshch. lyub. estestv. antropol. i etnogr. XXXIV, 2 (1882) 28.

Flowers bisexual, calyx edentate, petals broadly obovate, flat or curved at midrib and then notched, acuminate, curved inward; stylopodium

* Treatment by E.P. Korovin.

** From the Greek *hyalos* — transparent stone, glass, *laena* — involucre, spathe.

flattened-conical with dilated, sometimes elevated margin; styles short, reflexed; fruit oblong-cylindrical, sometimes slightly compressed laterally; mericarps with narrow commissure, the ribs inflated, with membranous undulant frill; resinous canals 1 per vallecule, more or less broad, or
 564 2-4 variable or narrow and equal canals in mesocarp, 2-8 toward commissure; carpophore free; seeds flat, concave or inflated; exocarp membranous, of single, large-celled layer, separating from small-celled mesocarp; stereomes forming columns in ribs. Monocarpic, geophilous herbs, with single stem and tuber, leaves dissected into small lobules, involucre and involucels membranous.

Four species confined to the Aral-Caspian lowlands of Central Asia. Taxonomically, *Hyalolaena* is close to *Scaligeria* DC.

1. Leaflets of involucre elliptic, membranous 2.
- + Leaflets of involucels lanceolate, only margins membranous 3.
2. Petals completely glabrous, 1.2 mm long, umbels to 10 cm wide, ca. 4 mm long, ribs with broad undulant membranous frill 1. *H. jaxartica* Bge.
- + Petals slightly hairy outside, 1.6 mm long, umbels smaller, fruit 3 mm long, ribs with narrow membranous margin. . . 2. *H. depauperata* Korov.
3. Ribs with frill folded crosswise, umbels of 5 rays arranged on spreading branches 3. *H. paniculata* Korov.
- + Fruit merely rugose, umbels of 10 rays, borne on reduced branches 4. *H. collina* Korov.

1. *H. jaxartica* Bge. in Mém. Sav. étrang. Ac. Sc. Pétersb. VI (1851) 128. — *Holopleura carioides* Rgl. et Schm., l.c. (1882) 28.

Perennial; glaucous plant, glabrous or scabrous only at leaf margins; tuber ovoid, entire or with 2-3 short thick appendages; stems cylindrical, 35-45 cm high, deeply furrowed, branching from base or higher to form corymbiform panicle, its neck covered with fibrous remnants of leaves; branches declinate, the upper exceeding central umbel; leaves early withering, the radical in a rosette, with long flat petioles dilated at base; blade oblong-oval, bipinnatisect, segments sessile, the terminal bipinnate-partite into linear, 1.5-2 mm long, densely arranged rounded lobules; cauline leaves sessile on short oblong sheath with membranous border; upper leaves nearly without blade. Umbels of 10-20 rays, flat above, to 10 cm wide, outer rays longer than inner; involucre of 6-8 broadly lanceolate,
 565 3-nerved leaflets; umbellets 20-flowered, with involucels of 5-6 elliptic or oblong-elliptic, almost entirely membranous leaflets nearly as long as umbellets; petals broadly obovate, with short inward curved tip; fruit oblong-ovoid, cylindrical, to 4 mm long; mericarps subcircular in cross section, the protruding ribs bearing a narrow undulant-curly frill; resinous canals rather broad, 1-4 per vallecule, 2 toward commissure, May-June. (Plate XXX, Figure 12.)

Solonetzic takys in the northern desert zone. — Centr. Asia: Ar.-Casp., Kyz. K. Endemic. Described from the Syr Darya River. Type in Paris.

2. *H. depauperata* Korov. in Bot. mat. Gerb. Inst. bot. in zool. AN UzSSR.

Perennial; glaucous plant with short scattered hairs; tuber thickened, with few appendages; stem 25-30 cm high, cylindrical, striated, corymbiformly

branching from middle or from above base, its neck covered with remnants of leaves, branches declinate, exceeding central umbel; leaves mostly radical, in dense rosette, on short furrowed petioles, their blade tripinnatisect into 2-3-lobed, hardly 1.5 mm long dense sections, their lobules small, narrowly lanceolate; cauline leaves with reduced blade, upper leaves developed as short sheaths. Umbels of 20-25 rays, convex above, ca. 5-6 cm across; involucre of 6-7 lanceolate leaflets; umbels to 30-flowered, their involucels of 5-7 oblong-elliptic leaflets, as long as pedicels; petals nearly square, with short inward curved tip, the peripheral pubescent, 1-2 mm long; fruit oblong-cylindrical, 3 mm long; mericarps subcircular in cross section; resinous canals single, rather broad, 2 toward commissure. April-May.

Stony slopes of desert hills. — Centr. Asia: Pam.-Al. (Nura-Tau and Kungur-Tau Mountains). Endemic. Described from Kungur-Tau near Vek-Budi. Type in Tashkent.

3. *H. paniculata* Korov. in Bot. mat. Gerb. Inst. bot. in zool. AN UzSSR, XII (1948) 20.

Perennial; glaucescent completely glabrous plant, with spherical, unbranched tuber; stems to 1 m high, cylindrical, striated, thrice branching from middle to produce broad spreading panicle; leaves early withering, the lower with short petioles dilated to short sheath, their blade oval, thin, tripinnatisect to 4 mm long, linear, acuminate sections; upper leaves with short sheaths. Umbels of 3-5 unequal, approximate rays ca. 2 mm across; involucres of 5 lanceolate leaves; umbellets 10-flowered, their involucels similar to involucre; flowers on thin rugose pedicels; petals elliptic, shallowly notched, with elongate obtuse inward curved tip, 1.6 mm long; fruit (unripe) ellipsoid, 2.8 mm long; mericarps circular in cross section, with crosswise crumpled ribs; resinous canals numerous, narrow. July-August.

Herbaceous mountain slopes in the steppe belt. — Centr. Asia: Pam.-Al. (Zeravshan Range). Endemic. Described from the Langar River valley on Zeravshan Range. Type in Tashkent.

4. *H. collina* Korov. in Bot. mat. Gerb. Inst. bot. in zool. AN UzSSR, XII (1948) 22.

Perennial; plant glaucescent, subglabrous, tuber nearly ovoid, lobate; stem 40-50 cm high, white-striated, twice branching from middle to produce rather dense panicle; radical leaves in rosette, petiolate, their blade triangular-oval, thin, bipinnatisect into 4-5 mm long pinnatifid sections, terminal lobules lanceolate, acuminate, with stiff ends; upper leaves reduced to short sheaths. Umbels of 8-10 unequal declinate 5-20 mm long rays; umbellets 7-10-flowered; involucre and involucels of 5 short-lanceolate leaflets; petals broadly elliptic, notched, with short acuminate tip, 1.8 mm long; fruit (young) ovoid, rugose crosswise; mericarps without distinctly protruding ribs; resinous canals 3-4 between ribs, 1 in rib, 8 toward commissure. May.

Dry clayey hills in foothill zone. — Centr. Asia: Syr. D. Endemic. Described from Fergana valley. Type in Tashkent.

Note. The ripe fruit of this species is unknown, though in its later stages it may develop the characteristic features of the genus. On the ovary no ribs were visible, but this fact does not raise any doubts whatsoever that the species belongs to *Hyalolaena*.

Genus 1034. **LIGUSTICUM** * L.

L. Sp. pl. (1753) 250. — *Haloscias* Fries, *Summa veget. Scand.* I (1846) 180. — *Hansenia* Turcz. in *Bull. Soc. Nat. Mosc.* XVII (1844) 754. — *Ligusticum* sect. *Euligusticum* Calest. in *Webbia*, I (1905) 209.

Calyx-teeth very short, petals obovate or obcordate, notched, with inward curved lobule, rarely not notched, fruit ovoid or elliptic, subcircular in cross section, stylopodium short-conical, styles elongate, reflexed, mericarps with 5 strongly protruding, often pterygoid main ribs, canals numerous in valliculae and toward commissure, albumen obscurely and obtusely pentagonal in cross section, flat or slightly concave toward commissure. Perennial herbs, with ternate-compound or multipinnate leaves.

Up to 50 species, in the northern hemisphere as well as in Chile and New Zealand.

- | | | |
|----|--|--|
| 1. | Leaves ternate | 2. |
| + | Leaves pinnate | 5. |
| 2. | Leaflets grayish beneath, covered with short curly hairs; umbels of 20–40 densely curly-haired rays; radical leaves often entire (Caucasus) | 4. <i>L. arafae</i> Alb. |
| + | Leaflets with sparse stiff hairs beneath; umbels of 7–13 glabrous or slightly scabrous rays; radical leaves never entire | 3. |
| 3. | Leaflets stiff-haired beneath; petals violet-purple | 3. <i>L. purpureopetalum</i> Kom. |
| + | Leaflets glabrous beneath; petals usually white | 4. |
| 4. | Umbels 4–10 cm wide, flat above; ripe fruit 2.5–4 mm wide, in lower leaves many nerves terminate freely, not forming meshes | 1. <i>L. scoticum</i> L. |
| + | Umbels 3–5.5(7) cm wide, convex at flowering; ripe fruit 2–2.5 mm wide, in lower leaves nearly all nerves anastomose to form meshes | 2. <i>L. hultenii</i> Fern. |
| 5. | Main umbels of 7–12 rays | 6. |
| + | Main umbels of 15–40 rays | 7. |
| 6. | Petals pink, leaf lobules narrowly linear, 2–4 mm long, 0.2–0.3 mm wide, acute; involuclers of 5 lanceolate leaflets with scarious margins (Carpathians) | 9. <i>L. mutellina</i> (L.) Crantz. |
| + | Petals (young) violet outside; leaf lobules lanceolate-linear, ca. 1 mm wide; leaflets of involuclers numerous, linear (Caucasus) | 10. <i>L. caucasicum</i> Somm. et Lev. |
| 7. | Leaflets of involucre and involuclers 10, ovate-lanceolate or lanceolate, scabrous-hairy, with broad scarious margins | 8. |
| + | Leaflets of involucre (if present) and involuclers narrowly linear or linear-filiform, with nearly not scarious margins | 9. |

* From the Greek *libystikon* or *ligystikon*, Dioscorides' name for an umbellifer from Liguria.

8. Umbels of 15–20 rays; leaflets of involucre and involucels scabrous; styles slightly longer than stylopodium 11. *L. pumilum* Korov.
 + Umbels of 25–35 rays; leaflets of involucre and involucels hairy; styles 3 times as long as stylopodium 12. *L. fedtschenkoanum* Schischk.
 9. Stem usually with winged ribs above; peripheral petals 2–2.2 mm long (Caucasus) 5. *L. alatum* (M.B.) Spreng.
 + Stem not winged; peripheral petals 1–1.5 mm long 10.
 10. Leaves glabrous along nerves above and beneath 8. *L. mongholicum* (Trucz.) Kryl.
 + Leaves scabrous along nerves above, often also beneath 11.
 11. Lobes of the last order 2–3 cm long; all umbels fertile; leaves obscurely scabrous along nerves 7. *L. discolor* Ldb.
 + Lobes of the last order 4–7 cm long; central umbel fertile, the lateral sterile; leaves profusely covered with thick stiff hairs along nerves, especially beneath 6. *L. physospermifolium* Alb.

Subgenus 1. *Haloscias* (Fries) Drude in E.-P. Pflanzenfam. III, 7–8 (1898) 212. — *Haloscias* Fries, l.c. (1846). — Pericarp of ripe fruit thin, dehiscing to release free seed; leaves ternately compound.

1. *L. scoticum* L. Sp. pl. (1753) 250; DC. Prodr. IV, 157; Ldb. Fl. Ross. II, 286. — *L. boreale* Salisb. Prodr. (1796) 164. — *L. biternatum* Stokes, Bot. Mat. Med. I (1812) 94. — *Haloscias scoticum* Fries, Summa veget. Scand. I (1846–1849) 180. — *Cenolophium scoticum* Car. Epit. Fl. Eur. II (1894) 271. — Ic.: Fedch. and Fler., Fl. Evrop. Ross. Figure 577. — Exs.: Fellman, Pl. arct. exs. No. 115.

Perennial; stem 15–40 cm high, branching above, finely ribbed, glabrous; leaves with long sheaths and long petioles, their blades biternate-parted, with ternately dissected primary lobules, segments of second order broadly triangular or ovate, largely and unevenly toothed, 3–6 cm long, 2–3.5 cm wide. Umbels 4–10 mm across, flat at flowering, of 7–11 unequal rays; involucre of 1–5 unequal leaflets; involucels of many linear leaflets, nearly as long as umbellets; petals white; flowers 6.5–8.5 mm long, 2.5–4 mm wide. July.

Sandy-clayey and stony coasts, usually outside the surf zone, shoals and inundated meadows. — Arctic: Arc. Eur.; European part: Kar.-Lap., Dv.-Pech. Gen. distr.: Scand., Atl. Eur. (British Isles), Iceland, Greenland, Labrador. Described from the coasts of England and Sweden. Type in London.

2. *L. hultenii* Fernh. in Rhodora, XXXII (1930) 7. — *Apium ternatum* Willd. ex. Schult. Syst. VI (1820) 431, non *Ligusticum ternatum* Willd., l.c. p. 555. — ?*Archangelica gmelini* DC. Prodr. IV (1830) 170, non *Ligusticum gmelini* Cham. et Schlecht. in Linnaea, I (1826) 391, nec Vill. Prosp. (1779) 24. — *Ligusticum scoticum* auct. Fl. orient extremi, non L. — Ic.: Kom. and Alis., Opred. rast. Dal'nevost. kr. Table 247 (1932); Fernh. l.c. pl. 193 a. 194 (fol.).

Perennial; stem 25–80 cm high, branching above, like leaves glabrous, finely ribbed; radical and median cauline leaves on long, sometimes violet

petioles abruptly dilated to broad sheaths, 1.5–3 cm long, their blade biter-nate-incised, the broadly ovate segments of the last order 3–7 cm long, 1–5 cm wide, rounded, unequally toothed or incised; cauline leaves smaller, sessile on oblong, sometimes violet sheath. Umbels of 7–11(13) unequal rays; involucre of 3–5 unequal linear-oblong leaflets with scarious margins; umbellets of many unequal rays; involucels of 5–7 oblong-linear leaflets as long as umbellet rays or longer; petals white or slightly pink, ca. 1.5 mm long; fruit 6–10 mm long, 2–2.5(3) mm wide, with 3 winged dorsal ribs; stylopodium short-conical; styles reflexed, as long as stylopodium or shorter. Fl. July–August, Fr. September.

Meadows along coastlines. — Far East: Okh., Kamch. Gen. distr.: Ber. (S. Alaska), Jap.-Ch. (Japan). Described from Kamchatka. Type in Stockholm.

Economic importance. Eaten as a vegetable in the Aleutians.

3. *L. purpureopetalum* Kom. in Izv. Bot. Sada AN SSSR, XXX, 1–2 (1931) 206.

Perennial; stem single, 50–60 cm long, cylindrical in cross section, smooth, only at great magnification very finely scabrous; radical leaves early withering; cauline leaves 3–4, the lower with 10–20 cm long, nearly tetragonal scabrous petioles; leaves of 3 leaflets 4–8 cm long, 3.5–7 cm wide, broadly ovate, cuneately tapering to base, obtusely or acutely toothed, stiff-haired along nerves beneath. Umbels 2–3 cm across, of 7–8 unequal glabrous rays; involucre of 5 linear, acuminate leaflets; umbellets ca. 1 cm
570 across; involucels of 5 linear leaflets as long as or slightly longer than umbellet rays; calyx-teeth ovate, acuminate, well developed; stylopodium conical; petals violet-purple; ripe fruit unknown. August.

Mixed mountain forests. — Far East: Uss. Endemic. Described from near Narva village in Posyet District. Type in Leningrad.

4. *L. arafae* Alb. in Bull. Herb. Boiss. II (1894) 250; Grossg., Fl. Kavk. III, 171. — Ic.: Alb. l. c. tab. VIII.

Perennial; rhizome thick, obliquely ascending; stems single or few, 70–170 cm high, finely ribbed, branching above, more or less densely covered with short curly hairs; radical leaves entire, long-petioled (30–60 cm), with orbicular cordate, unequally toothed blade, sometimes obscurely trifid above, or ternately compound of oblique-ovate, proximally cordate or rounded cordate leaflets; lateral leaves short-petioluled, the median longer; lower cauline leaves similar to the radical, of 3 leaflets, also long-petioluled; upper leaves smaller, their petioles shorter, dilated to sheath; all leaves subglabrous, green above, grayish, or with short curly hairs beneath. Umbels 6–8 cm across, of 20–40 usually unequal rays densely covered with curly hairs; involucre of 5–11 unequal linear pubescent leaflets a few times shorter than umbel rays; umbellets of many rays covered with short curly hairs; involucels of 5–11 linear-setiform leaflets; calyx-teeth obsolete; petals white, usually notched, dorsally pubescent; ovary and young fruit also densely covered with curly hairs, becoming subglabrous; fruit ovoid, usually glabrous, 5 mm long, with winged ribs; 3 canals at valliculae, 4 toward commissure; stylopodium conical; styles reflexed, usually shorter than stylopodium. Fl. July–August, Fr. September.

Subalpine meadows, 2,000–2,100 m. — Caucasus: Main Range (Caucasian nature reserve), W. Transc. Endemic. Described from Bzyb and other ranges. Type in Geneva, cotype in Leningrad.

Economic importance. The inhabitants of Abkhazia pulverize the highly aromatic rootstock and mix it with tobacco. In Abkhazia it is known as "arafe," hence the specific epithet.

Subgenus 2. *Euligusticum* Drude in E.-P. Pflanzenfam. III, 208 (1898). — Large plants, with 2–3-pinnate leaves. Umbels of (15)20–40 rays; involucre and involucels of linear or filiform-linear leaflets or involucre lacking; petals white or greenish.

571 5. *L. alatum* (M.B.) Spreng. in Umbell. Prodr. (1813) 40; Umbell. minus cognit. (1818) 125; Ldb. Fl. Ross. II, 286; Boiss. Fl. or. II, 972; Shmal'g., Fl. I, 402; Grossg., Fl. Kavk. III, 172. — *Athamanta alata* M.B. Fl. taur.-cauc. I (1808) 214. — *Selinum alatum* Poir. Encycl. Suppl. XIII (1817) 126. — *Cnidium myrtifolium* M.B. Fl. taur.-cauc. III (1819) 212. — *Silaus alatus* Link, Handb. I (1829) 329. — *Meum alatum* Baill. Hist. Pl. VII (1884) 107. — Ic.: Nov. Act. Acad. Nat. cur. XII, 1, tab. 10 (1824) fr.

Perennial; rhizome ascending, 2–2.5 cm thick, covered above with remnants of leaves; stem glabrous, 50–150 cm high, simple or branching above, especially in upper part with narrow membranous wings along ribs; leaves glabrous, triangular or broadly ovate, 40 cm long, 30 cm wide, many times ternate-pinnate-partite, their long petioles dilated to sheaths; lobes of the last order oblong, acute, pinnatifid, with oblong pinnatifid segments. Umbels 8–20 cm across, of many (30–40) slightly unequal, slightly scabrous rays; involucre of 5–13 unequal narrowly linear leaflets $\frac{1}{2}$ to $\frac{1}{3}$ the length of the umbel rays; umbellets of 30–40 unequal rays; involucels of 6–15 linear leaflets nearly as long as umbellet rays; petals pink at first, turning white, more or less deeply notched, 2 mm long; fruit ovoid, 3–5 mm long, glabrous, with 5 prominent narrow wings; stylopodium conical; styles reflexed, slightly longer than stylopodim. July–August.

Mountain and subalpine meadows, forest clearings, mountain beech-pine-birch forests. — Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: Arm.-Kurd., Iran. Described from N. Caucasus. Type in Leningrad.

6. *L. physospermifolium* Alb. Prodr. Fl. colch. (1895) 109; Grossg., Fl. Kavk. III, 172.

572 Perennial; entire plant smooth, glaucescent; stem 70–120 cm high, branching, hollow, finely ribbed; lower leaves long-petioled, twice ternately dissected, with sessile or short-petioluled lateral segments, terminal segment on longer petiolule, these and other segments dissected into 5 large oblong- or ovate-lanceolate cuneately tapering and decurrent lobes, often irregularly toothed or incised, 4–7 cm long, 1–2 cm wide; upper leaves smaller, their shorter petioles dilated to sheath, with tripartite terminal and bifid lateral segments, rarely all entire or toothed or incised. Umbels large, of many (15–40) very unequal rays scabrous above; terminal umbel with fertile flowers, the lateral sterile; involucre absent or of many narrowly

linear leaflets; umbellets of many roughly scabrous rays; involucre of 3–7 linear-filiform leaflets much shorter than umbellet rays; fruit 3.5–5 mm long, 1.5–3.5 mm wide, ovoid-oblong; mericarps with 5 narrow thickish wings; 3 canals in valliculae; stylopodium conical; styles recurved, twice as long as stylopodium. July–August. (Plate XXXIV, Figure 17.)

Subalpine meadows, fir and pine forests, 1,800–2,200 m. — Caucasus: W. Transc., Cisc. (State nature reserve, bassin or Uryuk). Endemic. Described from Adzhituko Range and mountains of Abkhazia (Khou, Mamdzyskhka and others). Type in Geneva, cotype in Leningrad.

Note. In the fertile umbellets usually only 2–8 flowers are fertile.

7. *L. discolor* Ldb. Fl. alt. I (1829) 321; Ej. Fl. Ross. II, 285; Kryl., Fl. Zap. Sib. VIII, 2013. — Ic.: Ldb. Ic. pl. Fl. Ross. IV, tab. 310.

Perennial; stem single, 100–150 cm high, 1–2 cm across, furrowed, glabrous, hollow, branching in upper part; leaves long-petioled (20–50 cm), triangular, paler beneath, very short-thick-hairy along edges and nerves above, tripinnate, with large blade (20–30 cm long and as wide); lobes of all orders petioluled, the tertiary ovate-lanceolate, pinnatifid or strongly toothed, 2–3 cm long, 1–2 cm wide; median cauline leaves smaller, less deeply dissected but lobes of the last order larger; upper leaves reduced to obsolete blade sessile on broad inflated sheath. Umbels 10–15 cm across, compressed in fruit, of 20–35 unequal rays covered with very short stiff papillae; involucre of 5–10 lanceolate-linear or linear, scabrous-hairy leaflets usually early deciduous; umbellets 1–2 cm across, involucels of 10 linear-filiform leaflets as long as umbellets; petals white, ca. 1.5 mm long, obcordate, tapering to short claw; fruit ovoid, 4–5 mm long, 2–3 mm wide, with 3 narrowly winged dorsal ribs and slightly wider marginal ribs; stylopodium conical; styles recurved, slightly longer or twice as long as stylopodium. June–July.

Open forests, shrubs, south of the distribution area, to 2,700 m. — W. Siberia: Alt. (SW); Centr. Asia: Dzu-Tarb., T. Sh., Pam.-Al. Endemic. Described from Altai. Type in Leningrad.

573 8. *L. mongholicum* (Turcz.) Kryl. in Fl. Zap. Sib. VIII (1935) 2014. — *Hansenia mongholica* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 93, nom. nud.; Turcz. op. cit. XVII (1844) 754; Ldb. Fl. Ross. II, 362.

Perennial; entire plant glabrous; root 1–1.5 cm thick, horizontal or ascending; stem 40–100 cm high, erect, finely furrowed, often violet especially at base, hollow, slightly branching with obliquely antrorse branches; lower leaves with long petioles, their overall size 20–40 cm long, 15–20 cm wide, blade broadly triangular, bi- or tripinnate; lower primary and secondary lobes petioluled, the median sessile, the upper fusing, secondary lobes sometimes with pair of opposite individual lobules at base, elsewhere with ovate-lanceolate, acuminate, rounded-dentate segments 1.5–3 cm long, 0.4–1.3 cm wide; upper leaves smaller, less dissected, sessile on amplexicaul inflated sheaths, 2.5–3 cm long. Umbels 5–11 cm across, of (11) 15–20 glabrous rays; involucre none; umbellets 0.6–1.2 cm across, many-flowered, of smooth rays; involucels of few filiform-linear, eventually deciduous leaflets, nearly as long as umbellet rays;

calyx-teeth triangular, obtuse, 0.25 mm long; petals greenish or whitish; fruit subglobose or broadly oval, 4–6 mm long, 3–5 mm wide; mericarps with 3 winged dorsal and 2 wider (ca. 1 mm wide) marginal ribs; stylopodium short-conical; styles divergent or recurved, shorter than stylopodium. July. (Plate XXXIV, Figure 16.)

Alpine and subalpine belt, on stony slopes, rock crevices, tall herbaceous meadows, Siberian stone pine – spruce and larch – Siberian stone pine mountain forests. – W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau. Gen. distr.: Mong. (Kentei Mountains, Lake Khubsugul). Described from Nukha-Daban. Type in Leningrad.

Subgenus 3. *Mutellina* Thell. in Hegi, *Illustr. Fl. Mitteleur.* V, 2 (1926) 1316. – Involucre none or of few, early deciduous leaflets. Umbels of 7–12 rays; petals pink or violet.

9. *L. mutellina* (L.) Crantz, *Cl. Umbell.* (1767) 82. – *Phellandrium mutellina* L. *Sp. pl.* (1753) 255. – *Aethusa mutellina* Lam. *Fl. Fr.* (1779) 1025. – *Meum mutellina* Gaertn. *De Fruct.* I (1788) 106; DC. *Prodr.* IV, 162; Ldb. *Fl. Ross.* II, 288 – *Oenanthe purpurea* Poir. *Encycl. Meth.* (1796) 530. – *Seseli mutellina* Steud. *Nom. ed.* 1 (1840) 530, 771. – *Meon mutellina* St.-Lager in *Ann. Soc. Bot. Lyon*, 574 VII (1880) 130. – *Selinum mutellina* Prantl, *Excursionsfl. Bayern* (1884) 284. – *Ic.: Penzig. Fl. Alp. Illustr. ed.* 2, tab. 18 (1915).

Perennial; root vertical or ascending, ca. 4 mm thick, its neck densely covered with dark brown fibrous leaf remnants; stem 8–20 cm high, erect or ascending at base, glabrous, simple or slightly branching above, finely ribbed; radical leaves glabrous, their petioles nearly as long as blade, abruptly dilated to broad ovate sheaths with parallel thick nerves and scarious margins; blade triangular-ovate, 2–7 cm long, 1.5–3.5 cm wide, 3 or nearly 4 pinnatisect, of the 3–5 pairs of primary lobes the lower slightly removed from the rest, short-petioluled, the others sessile, terminal lobules narrowly linear, acute, 2–4 mm long, 0.2–0.3 mm wide; cauline leaves 1–2, smaller, sessile on dilated, slightly violet sheath. Umbels 1.5–2.5 cm across, of 7–10 glabrous rays; involucre none; umbellets 0.5–0.6 cm across, many-flowered; involucels of 5 lanceolate, acute leaflets with scarious margins; petals pink, obcordate, notched, with inward curved lobule, ca. 1 mm long; fruit elliptic or ovoid-oblong, slightly compressed laterally, 4–6 mm long, ca. 2.5 mm wide, glabrous; canals 3 per vallecule, 6 toward commissure; stylopodium short-conical; styles reflexed, $1\frac{1}{2}$ times as long as stylopodium. July.

Alpine and subalpine meadows. – European part: U. Dns. (Carpathians). Gen. distr.: mountains of Centr. Eur. Described from Switzerland. Type in London.

10. *L. caasicum* Somm. et Lev. in *Nuovo Giorn. bot. ital.* (1895) 77 and in *Tr. Bot. Sada*, XVI (1900) 188; Grossg., *Fl. Kavk.* III, 172. – *Ic.: Somm. et Lev. in Tr. Bot. Sada*, XVI, Table XX.

Perennial; rhizome obliquely ascending, woody, producing flower-bearing stems with rosettes of leaves; entire plant glabrous, pale green; stem 30–50 cm high, its base covered with brown squamiform sheaths,

simple or with 1 branch, furrowed, unifoliate; radical leaves and leaves of rosettes ovate-lanceolate, bipinnatisect, their petioles as long as blade, dilated to short sheath with broad membranous margins; secondary lobes ovate, pinnatisect or pinnatipartite into linear-lanceolate obtuse short-mucronate lobules; cauline leaves similar to the radical but smaller. Umbels of 12 short 1–1.5 cm long rays; involucre of few leaflets or none; umbellets of few unequal rays scabrous in upper part; leaflets of involucre many, linear, nearly as long as umbellets, with violet margins, very finely
575 ciliate (under magnification); calyx-teeth obsolete; petals obcordate, with short claw, attenuate to acute inward curved tip; fruit ovoid-oblong, 3 mm long, 2 mm wide, barely compressed laterally; mericarps with 5 equal acute almost winged ribs, the lateral ribs hardly elongating; canals 3 per vallecule, 4–5 toward commissure; albumen semicircular; stylopodium short-conical; styles reflexed, longer than stylopodium; carpophore parted nearly to base. July.

Meadows in subalpine belt. — Caucasus: Cisc. (Main Range). Endemic. Described from Klukhori Pass, 2,200–2,700 m. Type in Florence.

Note. A little known species, not represented in the herbarium of the Botanical Institute. The description follows Sommier and Levier.

Subgenus 4. *Pachypleuroides* Schischk. subg. nov. in Addenda XV, 604. — Stem 20–60 cm high, involucre and involucrels of ovate-lanceolate, scabrous-hairy leaflets with broad scarious margins, petals white.

11. *L. pumilum* Korov. in Bot. mat. Gerb. Gl. Bot. Sada, V (1924) 82. Perennial; root thick, ca. 1.5 cm across its neck densely covered with brown fibrous leaf remnants; stems single or 2, 20–60 cm high, erect, glabrous, angular, strongly ribbed, with obliquely antrorse branches from base sometimes overtopping main stem; radical leaves numerous, oblong, their petioles shorter than blade, total size 8–12 cm long, 2.5–4 cm wide, thin-scabrous-hairy or subglabrous, bi- or nearly tripinnatisect; primary lobes sessile, the lower remote, ovate, pinnatifid into deeply dentate ovate lobules with broadly ovate teeth produced to white cusp; lower cauline leaves smaller, sessile on oblong-lanceolate sheath; in uppermost leaves sheath large, blade obsolete. Umbels 2.5–4 cm across at flowering, of 15–20 ribbed scabrous rays; involucre of 10 narrowly lanceolate or ovate-lanceolate, acuminate, scabrous-hairy leaflets with broad scarious margin, slightly shorter than umbel rays; umbellets ca. 1 cm across; involucrels of ca. 10 lanceolate or linear-lanceolate scabrous-hairy acuminate leaflets longer than umbellets; calyx-teeth triangular-lanceolate, early deciduous;
576 petals white, ovate, on 1 cm long claws, with inward curved tip; fruit ovoid, slightly compressed dorsally, 4 mm long, 2.8 mm wide, glabrous or slightly scabrous-hairy, dorsal ribs narrowly winged, the lateral broader; 3 canals per vallecule, 8 toward commissure; stylopodium conical; styles reflexed, slightly longer than stylopodium. July. (Plate XXX, Figure 11.)

Stony southern slopes, 2,500–2,900 m. — Centr. Asia: T. Sh. (W.). Endemic. Described from Akbash-Tau Mountains. Type in Leningrad.



PLATE XXXVII. 1—*Pachypleurum mucronatum* (Schrenk) Schischk.; 2—*P. alpinum* Ldb.; 3—*P. gayoides* (Rgl. et Schmalh.) Schischk.

12. *L. fedtschenkoanum* Schischk. sp. nov. in Bot. mat. Gerb. Bot. Inst. AN SSSR, XIII (1950) 166.

Perennial; root vertical, 1–2 cm thick, its neck densely covered with dark brown leaf remnants; stem usually single, 20–40 cm high, erect, cylindrical, glabrous, finely ribbed, nearly from base with few obliquely antrorse branches shorter than main stem; radical leaves oblong or ovate, numerous, their petioles nearly as long as blade or shorter, with petiole 7–14 cm long, 2–7 cm wide, thinly scabrous-hairy or subglabrous, bi- or nearly tripinnatisect; primary lobes sessile, the lower remote, ovate, pinnatisect into deeply dentate ovate lobules with ovate, acute teeth; cauline leaves few, smaller, sessile on dilated sheath; uppermost leaves with obsolete blade. Main umbel 5–12 cm across, or 25–35 spreading-hairy rays; leaflets of involucre 10–12, lanceolate, usually densely pubescent, rarely subglabrous with broad scarious margins, one half the length of umbel rays or less; umbellets many-flowered, 1.5–2 cm across; leaflets of involucels many, lanceolate or linear-lanceolate, with broad scarious margins, acuminate, densely pubescent, nearly as long as umbellets; petals white, ca. 1 mm long, with inward curved tip; fruit ovoid, slightly compressed dorsally, 4 mm long, 2 mm wide, dorsal and marginal ribs broadly winged; stylopodium short-conical; styles 3 times as long as stylopodium. July.

Mountain slopes, 2,400–2,700 m. — Centr. Asia: Pam.-Al. Endemic. Described from the upper reaches of Zeravshan River (Kara-Kul). Type in Leningrad.

579 Genus 1035. **PACHYPLEURUM** * Ldb.

Ldb. Fl. alt. I (1829) 296; Calestani in Webbia, I (1905) 215. — Neogaya Meisn. Plant. vasc. gen. (1831) 144. — Arpitium Neck, Elem. I (1790) 168 p.p. — Gaya Gaud. Fl. Helv. II (1828) 389, non H.B.K. (1821)

Calyx-teeth short, obsolete; petals white, in peripheral flowers of umbellet often unequal in width, wider, notched; fruit ovoid, dorsally compressed; stylopodium pulviniform; styles slightly or twice as long as stylopodium; mericarps with 5 strongly protruding thickish ribs, the marginal slightly wider than the rest; mesocarp thickish, spongy; filiform vascular-fibrous bundles at base of ribs; canals 3–5 per vallecule, rarely solitary, or canals absent, 2–10 toward commissure; albumen plano-inflated. Perennial mountain herbs, often with leafless stem and well expressed involucre and involucels.

Four species in the mountains of Europe and Asia and in the Arctic.

1. Involucre of short, broadly ovate or lanceolate, nearly entire, scarious sometimes connate leaflets; entire plant small, glabrous, with numerous decumbent or ascending leafless flower scapes 3. *P. gayoides* (Rgl. et Schmalh.) Schischk.
- + Leaflets of involucre free, sometimes as long as umbel; plant glabrous or short-scabrous-hairy under inflorescence, often also on leaves, with leafy stems or numerous leafless flower scapes 2.

* From the Greek *pachy* — thick, *pleura* — rib, referring to the thick ribs as contrasting with the thin-walled fruit.

2. Stems leafy, often branching; terminal lobules of leaves usually short-mucronate; leaflets of involucre always entire 2. *P. mucronatum* (Schrenk) Schischk.
- + Stems usually erect, leafless or of 1 leaf; terminal lobules of leaves acute but without mucro; leaflets of involucre often 2–3-toothed above 1. *P. alpinum* Ldb.

1. *P. alpinum* Ldb. Fl. alt. I (1829) 297; Fl. Ross. II, 331. — *Peucedanum selinoides* DC. Prodr. IV (1830) 180, synonym. excl. — *Conioselinum gayoides* Less. in Linnaea, IX (1834) 178. — *Neogaya simplex* α *albomarginata* Schrenk, Enum. pl. nov. II (1842) 41; Ldb. Fl. Ross. II. 289. — *Ligusticum alpinum* F. Kurtz in Bot. Jahrb. XIX (1894) 464; Drude in E.-P. Pflanzenfam. III, 8 (1898) 212. — *L. mutellinoides* Hult. Fl. of Kamtchatka, III (1929) 164, non Vill. — *L. mutellinoides* var. (vel subsp.) *alpinum* Thell. in Hegi, Illustr. Fl. d. Mitteleur. V, 2 (1926) 1325. — *Arpitium alpinum* K.-Pol. in Bull. Soc. Nat. Mosc. n. s. XXIX (1915) 172; Kryl., Fl. Zap. Sib. VIII, 2044. — Ic.: Ldb. Ic. pl. Fl. Ross. IV, tab. 344. — Exs.: G. R. F. No. 2621.

Perennial; root usually fusiform, its neck covered with leaf remnants; stem erect, 3–40 cm high, glabrous, very short-scabrous-hairy only under inflorescence, furrowed, leafless or of 1 leaf, terminated by single umbel; radical leaves oblong-ovate, their petioles long dilated to oblong sheath, their blade 2–10 cm long, 1–5 cm wide, bi- or tripinnate (rarely nearly simple-pinnate), with lanceolate-linear, acute segments 0.2–1(3) cm long, 1(3) mm wide. Umbels 2–4 cm across, or 10–20 scabrous, nearly equal rays; involucre of many linear-lanceolate leaflets, expanding above, sometimes 2–3-toothed, with broadly scarious margin, nearly as long as umbel rays; involucels of 5–10 leaflets nearly as long as umbellets; petals white, long persistent, in peripheral flowers unequal, the 3 peripheral petals ca. 1.5 mm long, obcordate, notched, with small acute lobule at base of notch, the two inner petals slightly smaller, hardly notched; fruit broadly ovoid, ca. 4 mm long, 3–3.5 mm wide. From end of June–August. (Plate XXXVII, Figure 2.)

Moss, moss-lichen, stony and patchy tundras, cliffs, sandy slopes, pebbly bluffs, slightly turfed dunes, forb and alpine meadows, sometimes in gravels (in Arctic zone and alpine belt). — Arctic: Arc. Eur., Nov. Z., Arc. Sib., Chuk.; European part: V.-Kama (Urals); W. Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: Kamch.; Centr. Asia: Dzu-Tarb. (Saur, Tarbagatai, N. Dzungarian Ala-Tau). Gen. distr.: Mong. (?), Ber. Described from Altai (Krestovaya Mountain, Aigulak Range). Type in Leningrad.

Note. *P. simplex* (L.) Rchb., very close to *P. alpinum*, occurs in the mountains of W. Europe (Fl. Germ. excurs. (1832) 471. — *Laserpitium simplex* L. Mant. I (1767) 56. — *L. mutellinoides* Crantz, Cl. Umb. emend. (1767) 67. — *Ligusticum mutellinoides* Vill. Prosp. (1779) 25. — *L. simplex* All. Fl. Pedem. II (1785) 15. — *Gaya simplex* Gaud. Fl. Helv. II (1828) 389. — ? *G. multicaulis* Schur, Enum. transs. (1866) 259. — *Arpitium simplex* Sweet, Hort. Brit. ed. 2 (1830) 591. — *Neogaya simplex* Meissn. Plant. vasc. gen. (1838) 144. — *Selinum simplex* Prantl, Excursfl. Bayern (1884) 284, and

581 extends in the west to the Tatra Mountains, but is as yet unknown from the

USSR. It differs from *P. alpinum* Ldb. by the more strongly dissected leaves and by the wings of the fruits being sublinear not ovate-lanceolate in cross section.

2. *P. mucronatum* (Schrenk) Schischk. comb. nov.—*P. albomarginatum* Rupr. in Ost.-Sack. et Rupr. Sertum tianschan. (1869) 49, non *Neogaya mucronata* var. *albomarginata* Schrenk (1842).—*N. mucronata* Schrenk in Fisch. et Mey. Enum. pl. nov. II (1842) 40; Ldb. Fl. Ross. II, 289.—*N. urbis malorum* M. Pop. in Perech. sem. Almaatinsk. Bot. Sada, 2 (1935) 14.—*N. nemorosa* Korov, in Sistem zam. Gerb. Inst. bot. i zool. AN UzSSR, VIII (1947) 12.—*Ligusticum albomarginatum* Drude in E.-P. Pflanzenfam. III, 8 (1898) 212.—*?L. wolffianum* Fedde in Repert. spec. nov. XXVII (1930) 318.—*Libanotis subsimplex* M. Pop., in Perech. sem. Almaatinsk. Bot. Sada, 2 (1935) 13.

Perennial; root usually rather thick, 6–16 mm across its neck thickened, densely covered with dark brown fibrous leaf remnants; stems 2–5(11) or single, 5–60 cm high, ascending at base, hollow, glabrous, furrowed, stiff-haired only under umbel (very rarely glabrous), simple or with obliquely antrorse branches in lower part, leafless or with 1, rarely 2–4, leaves; radical leaves usually many, oblong, narrowly ovate, their petioles more or less long, their blade 2–15 cm long, 1–4 cm wide, bi- or tripinnate, with lanceolate-linear, acute or more or less long-mucronate segments; cauline leaves lanceolate, less dissected, their short petioles dilated into oblong-lanceolate sheath; uppermost leaves small, sessile. Umbels on long stalk, compressed, of 18–20 scabrous rays; involucre of 9–11 narrow lanceolate, acuminate, more or less pubescent, early deciduous leaflets with broad membranous margins as long as umbellet rays; calyx with triangular-lanceolate, early deciduous teeth; petals white, short-clawed, notched, with inward curved tip, 0.8 mm long; fruit ovoid, 4 mm long, ca. 2.5 mm wide, glabrous or sparingly pubescent, slightly compressed dorsally; dorsal ribs markedly protruding, narrowly winged, lateral ribs thicker and broader; canals 3 per vallecula, sometimes 1–2 very narrow additional canals under ribs, 8 toward commissure; stylopodium conical, with undulant base; styles divergent, much longer than stylopodium, nearly as long as fruit. June–August. (Plate XXXIV, Figure 18; Plate XXXVII, Figure 1.)

- 582 Alpine and mountain meadows, old moraines, stony mountain slopes, mountain steppes, rock crevices, Central Asia juniper woodlands, sometimes along banks of mountain streams, ascending to 4,000 m.—Centr. Asia: Dzu-Tarb. (south of Dzungarian Ala-Tau), T. Sh., Pam.-Al. Gen. distr.: Sinkiang. Described from Dzungarian Ala-Tau. Type in Leningrad.

3. *P. gayoides* (Rgl. et Schmalh.) Schischk. comb. nov.—*Meum gayoides* Rgl. et Schmalh. in Puteshestv. v Turkestan A. P. Fedchenko, 18, III (1882) 32.—*M. alatum* Korov. in Sistem. zam. Gerb. Inst. botan. i zoolog. AN UzSSSR, VIII (1947) 15, non Baill.—*Ligusticum gayoides* Korov. in Izv. Inst. pochvov. i geobot. Tsentr.-az. univ. I (1925) 106, in Note.

Perennial; root rather thick, vertical, multicapital; stems leafless, usually many, 5–15(20) cm long, creeping or ascending, glabrous; leaves numerous, all radical, short-petioled, glabrous, oblong, 2–5(10) cm long,

1–2 cm wide, nearly bipinnatisect; primary lobes sessile, broadly ovate or ovate, 3–10 mm long, 2–10 mm wide, dissected into short lanceolate obtuse mucronate lobules or primary lobes deeply dentate. Umbels 1.5–3 cm across, of 5–15 furrowed rays scabrous above or subglabrous; involucre of 5–12 ovate or ovate-lanceolate, nearly entire, scarious leaflets much shorter than umbel rays; umbellets 10-flowered; involucels of 5–10 lanceolate leaflets with broad scarious margins, usually shorter than umbellets, glabrous, very rarely slightly ciliate; fruit ovoid, ca. 5 mm long, 2.5 mm wide; stylopodium short-conical; styles reflexed, $1\frac{1}{2}$ –2 times as long as stylopodium; mericarps with narrowly winged dorsal ribs, marginal ribs twice as wide; canals narrow, 3–5 per vallecule, 10 toward commissure. (Plate XXXIV, Figure 19; Plate XXXVII, Figure 3.)

Stony and pebbly slopes, 3,000–4,000 m. — Centr. Asia: T. Sh., Pam. — Al. Described from Kchi-Alai Mountains. Endemic. Type in Leningrad.

Genus 1036. **CENOLOPHIUM*** Koch

G. D. J. Koch, Generum tribuumque Umbelliferarum nova dispositio, Ergänzungsbl. zur S. 103 (1824)

583 Calyx-teeth obsolete; petals white, broadly ovate, notched, with inward curved lobule in notch; fruit oblong, mericarps with 5 nearly equal winged hollow ribs; canals solitary under valleculae, 2 toward commissure; albumen nearly flat toward commissure; in ripe fruit seeds nearly free, easily separating from wall; stylopodium pulviniform; carpophore bifurcated. Perennials, with large, tripinnatisect leaves geniculately curved below.

Four to five species in N. Europe and N. America.

1. *C. fischeri* (Spreng.) Koch, l.c. (1824); Ldb. Fl. Ross. II, 282; Kryl., Fl. Zap. Sib. VIII, 2018. — *C. divaricatum* Bess. in Flora, XV, II Beibl. (1832) 27. — *C. lapponicum* Nyl. ex Nyl. et Sael. Herb. Mus. Fenn. (1859) 33. — *C. fischeri* var. *lapponicum* Nyl. in Spicil. pl. Fenn. Centuria altera (1844) 5. — ? *Peucedanum minus* Poir, Encycl. Meth. V (1804) 228, excl. syn. et patr. — *P. album* Fisch. Cat. Horti Gorenk. ed. 2 (1812) 46, nom. nud. — *Cnidium fischeri* Spreng. Syst. veg. I (1819) 888; Shmal'g., Fl. I, 402. — *Athamanta denudata* Fisch. ex Hornem. Hort. Hafn. Suppl. (1819) 32. — *Crithmum mediterraneum* M. B. Fl. taur.-cauc. III (1819) 215. — *Angelica fischeri* Spreng. in Schult. Syst. VI (1820) 228. — *Ligusticum fischeri* Link, Enum. Horti berol. I (1821) 276. — *L. divaricatum* Ldb. Ind. sem. Horti Dorpat. (1824) 5; DC. Prodr. IV, 159. — *Silaus longifolius* var. β . Ldb. Fl. alt. I (1829) 324. — *Seseli aspergillifolium* Bogusl. in Erman's Archiv, VI (1848) 63. — *Selinum fischeri* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 108. — Ic.: Fl. Yugo-Vost. V, Figure 531. — Exs.: G. R. F. No. 62, No. 1220, 2611, 2612.

Perennial; entire plant glabrous; stem 50–120 cm high, slightly furrowed, more or less curved at nodes, branching in upper part; leaves broadly triangular, 10–20 cm long and nearly as wide, their long petioles dilated into narrow sheath, tripinnate, geniculately curved below, with divaricate leaflets not in one plane; terminal lobes linear, lanceolate-linear, 1.5–6 cm long,

* From the Greek *kenos* — empty, *laphos* — comb; ribs of fruit inflated-hollow.

1–5 mm wide; upper leaves smaller, less dissected, on short sheathing petioles. Umbels 5–10 cm across, of 15–25 glabrous rays; involucre of 1 leaflet or absent; umbellets 10–15 mm across; involucels of many narrowly linear or linear-subulate leaflets as long as pedicels; petals white, orbicular-ovate, slightly notched at apex; fruit broadly ovoid, 3.5–5 mm long, ca. 2 mm wide. June–August.

Inundated meadows, river banks, sometimes solonchic meadows. – European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U.V., V.-Don, V.-Kama, Balt., U.Dnp., M.Dnp., Bl.(?), Transv.; W.Siberia: Ob, U.Tob., Irt., Alt.; E.Siberia: Ang.-Say., Yenisei(?), Lena-Kol.(?), Dau.; Centr.Asia: Ar.-Casp., Balkh., Dzu-Tarb. Gen. distr.: Centr.Eur. (extreme East). Described from the Volga area. Type in Berlin.

Note. The plants growing along the shores of the White Sea were recognized as a distinct species, but a study of the material does not warrant such separation. The differences noted by Nylander for *C. lapponicum* have not been confirmed; roughness of umbel rays could not generally be confirmed and in the structure of the petals no differences could be found. Many of the specimens had longer leaflets (to 8 cm), but even this character does not provide a reliable distinction as at the same localities specimens with short leaflets could also be found. The question of the independence of the species distributed along the shores of the White Sea requires further study. In separating it the name *C. lapponicum* Nyl. cannot be retained because *C. aspergillifolium* (Bogusl.) Schischk. has priority.

DIAGNOSES PLANTARUM NOVARUM
IN TOMO XVI FLORAE URSS COMMEMORATARUM
(DIAGNOSES OF NEW SPECIES MENTIONED IN VOLUME XVI)

Decembri 1950

HEDERA L.

587

1. ***H. caucasigena*** Pojark. spec. nov. — *H. helix* M. B. Fl. taur.-cauc. I (1808) 174, p. p. (quoad pl. cauc.). — *H. helix* ssp. *caucasica* Kleop. in sched. — **Exs.:** H. F. R. n° 1771 (sub *H. helix*).

Caulis ad arbores alte scandens primo pilis stellulatis subtomentosus mox glabratus. Folia biennia coriacea glabra supra atroviridia nitida subtus pallidiora, surculorum sterilium terrestrium saepissime trilobata rarius subquinelobata, ambitu saepius ovata vel lanceolato-ovata basi sagittata, lobo medio valde producto sensim angustato apice obtuso vel acuto, rarius subrotundata basi cordata lobo medio late triangulari, margine non raro undulata; folia ramorum fertilium (et sterilium scandentium) integra vel rarissime subangulata ad 7 (9) cm longa et 4.5—6 (6.5) cm lata ovata rarius ovato-rhomboidea vel subrotundata, superiora nonnunquam lanceolata acuminata vel acuta, basi rotundata subrotundata vel cuneata interdum obliqua, margine plana vel undulata. Petioli longitudine variabili, juveniles griseo stellulato pubescentes demum glabri. Umbellae vulgo (3) 5—12 in racemis elongatis vel ovatis congestae interdum solitariae, semiglobosae vel globosae, terminales 20—27 (32) mm diam. ad 30 (40)-florae, laterales (15) 17—23 (27) mm diam. 10—28-florae. Pedunculi graciles 2—3.8 cm longi, 0.6—0.8 mm diam. (in sicco); pedicelli tenues 5—9 (12) mm, in fructu 8—15 (18) mm longi, una cum ovario, axe, pedunculisque sub anthesi griseo-tomentosi, pilis stellatis 5—6 (7—8) radiatis, in fructu nonnunquam fere glabri. Calycis dentes minutissimi late triangulares, stylopodio breviter conico multo breviores. Petala 2—2.5 (3) mm longa 1.5 mm lata, oblonge-ovata, acuta, sub anthesi reflexa viridia, extus pubescentia intus nervo elevato praedita. Filamenta petalis paulo breviora, antherae ovatae. Stylus ca. 1 mm longus. Fructus nigri, 5—9 mm diam. vulgo 2—4 (5)-pyreni. Fl. IX—XI; fr. IV—VI.

Habitat. In silvis montanis regionis inferae et mediae.

Area geographica. Ciscaucasia occidentalis, Transcaucasia occidentalis, Kachetia, Lazistan.

Typus. Transcaucasia occidentalis (Abchasia), distr. Suchumi, prope pag. Jurjevskoe, 5 IX 1902, leg. G. Woronow et O. Woronowa (Exs. H. F. R. n° 1771).

* [This appendix has been reproduced photographically from the Russian original.]

Affinitas. Differt ab *H. helice* L. et *H. taurica* Carr. floribus umbellis minoribus, pilis plerumque 5—6-radiatis nec non foliorum ramorum terrestrium forma.

ARALIA L.

2. **A. Schmidtii** Pojark. spec. nov. — *A. racemosa* var. *sachalinensis* Rgl. in Ind. semin. Hort. Petr. (1864) 22. — *A. cordata* Miyabe et Miyake, Fl. Saghal. (1915), non Thunb. — *A. sachalinensis* hort. ex Siebert et Voss in Vilmorin's Blumengärtn. 3 Aufl. I (1896) 403, nom. nud. pro syn.

Herba perennis radice crassa carnosa. Caules numerosi erecti simplices ad 1 m alti pilis minimis crispatis sparse tecti. Folia longe petiolata lamina amplissima ad 60 cm longa late deltoidea impari bi-tripinnata, pinnis primi ordinis oppositis pinnatis 3—7(9)-foliolatis, infimis saepe bipinnatis; foliola petiolulata, petiolulis 0.3—1.5 cm longis, elongata vel rarius late ovata 4—20 cm longa, 1.7—10 cm lata, lateralia saepe obliqua, apicem versus sensim rarius breviter acuminata et in acumen attenuata. basi cordata vel rotundata vel nonnunquam subtruncata, margine regulariter simpliciter serrata vel rarius partim duplicato serrata, supra glabra vel sparse sed ad venas densius minute hirtella, subtus ad venas et venarum rete pallide-fusco hirtella; petiolus, rachis et petioluli etiam pilis crispatis fuscis pubescentes. Inflorescentia in apice caulis terminalis erecta paniculata vel fere racemosa, 14—37(40) cm longa, nonnunquam in axillis foliorum superiorum 1—3 inflorescentiis brevibus 1—3-umbellatis. Axes secundarii 3.5—6 cm longi, superiores in apice axis primarii 4—8 ni umbellatim congesti, ceteri in f. *typica* Pojark. alternatim vel partim 2—3(5)-ni semiverticellatim dispositi, in f. *verticillata* Pojark. omnes in verticillos 8—15-nos remotos congesti. Axes secundarii saepe umbellam solitariam terminalem florum fertilium gerunt, sed interdum etiam 1—2(3) axes laterales tertii ordinis breves, 0.8—1.5 cm longos cum umbella florum sterilium. Umbellae globosae, terminales 2—3.5(4) cm diam. (pedicelli tenues 10—20 mm longi), laterales 0.8—1.5(1.7) cm diam. (pedicelli 0.4—0.8 mm longi). Bractee et bracteolae lineares una cum axibus petiolisque dense pallide-fusco hirtellae. Flores quinque-vel sexameri sepalis erectis deltoideis petalis lanceolato-triangularibus acuminatis reflexis, stylis basi vel ad medium inter se connatis. Fructus globosi 5—6-pyreni.

Habitat. Ad margines silvarum inter frutices in declivibus herbosis sparse occurit.

Area geographica. Ins. Sachalin (pars australis et media) et Hokkaido.

Typus. Litus occidentale insulae Sachalin prope Due, 2 VIII 1860 leg. Glehn.

Affinitas. Ab *A. cordata* Thunb. et *A. continentali* Kitagaw. inflorescentiae ramulis brevibus pauciramosis vel fere simplicibus nec non umbellis maioribus bene differt.

3. *E. balchanicum* Bobr. n. sp.

Planta albicanti-viridis semimetralis; caules vulgo bini superne dichasialiter parum ramosi; folia rigida, inferiora longe petiolata petiolis 10—15 cm basi paulo dilatatis laminis duplo-triplo longioribus; lamina ambitu triangularis, 4—6 cm long., profunde tripartita, lobis late ovatis (inferioribus obliquis) ad rachin decurrentibus profunde pinnatifidis, dentibus in spinam rigidam excurrentibus; folia praecocia minora breviter petiolata, minus spinescentia; caulina non numerosa sessilia profunde tripartita segmentis angustioribus. Capitula 10—20 inflorescentiam laxam formantia, globosa 10—20 mm long., bracteae involucrales 6—7 rigidissimae subulatae 3—4 cm long., 2—3 mm lat. in spinam excurrentes basi spinis 2—3 deorsum spectantibus auctae; flores in capitulo 20—30, bracteolis lanceolatis acuminatis eos superantibus; sepala lanceolata breviter mucronata, mericarpia a dorso compressa squamis hyalinis lateralibus permagnis obsita, in medio minus, quo-modo superneque, squamosa. Fl. Junio.

Habitat. In declivibus lapidosis in fruticetis montium Balchany Majores Turcomaniae occidentalis.

Typus. Balchany Majores, promontorium australe prope fontem Berk-tscheme dicto non procul a statione viae ferreae Dzhebel. 3 VI 1928. Leg. E. Bobrov et A. Jarmolenko.

Affinitas. Affine *Eryngio nigromontano* Boiss. et Buhse, bene differt tamen foliis radicalibus minoribus ambitu triangularibus dentibus in spinam rigidam excurrentibus, petiolis paulo dilatatis, laminis duplo-triplo longioribus; capitulis minoribus, mericarpiis margine vix pterolophis.

4. *E. mirandum* Bobr. n. sp.

Planta ut videtur monocarpica; caules singuli ca. 40—60 cm longi albescentes erecti basi 6—9 cm crassi, superne furcati, ramulis axillaribus brevibus capitula solitaria gerentibus; folia basalia 5—6 submarcescentia oblanceolata ad petiolum angustata, qui non plus quam sesqui lamina brevior; laminae 8—10 cm long., in parte inferiore usque 4 cm altae, margine acuto-dentatae utrinque dentibus 8—10 inaequalibus attenuatis pungentibus armatae, folia caulina ambitu similia, amplexicaulia sessilia dentibus majoribus acute magis pungentibus; folia superiora lanceolata subpinnatim grosse acute dentata. Capitula 5—10, de quibus 1—3 in axillis foliorum solitaria, cetera terminalia, globosa 1—2 cm long.; bracteae involucrales 7—9, 1.5—3 cm long. subulatae, integrae; bracteae florales lanceolatae, carinatae, acuminatae flores superantes; fructus 7—8 mm, calycis dentes 3—3.5 mm long., nervo crasso in spinulam abeunte percursa; mericarpia dorso margineque squamis albis cartilagineis, superne longioribus densioribusque tecta.

Habitat. In schistosis reliquiarum montanarum deserti Kizylkum.

Typus. Karakalpakkia, in monte Beltau, leg. Muravliansky 21 VI 1932.

Affinitas. Ab affini *E. karatavico* Iljin foliis basalibus submarcescentibus ad petiolos angustatis, petiolis non plus quam sesqui lamina brevioribus dignoscitur.

CHAEROPHYLLUM L.

5. *Ch. khorossanicum* Czerniak. sp. nova in sched. ad herb. Leninopolit.

Perenne; radix ad 1 cm crassa, verticalis; caules pauci, erecti vel adscendentes, 30—80 cm alti, e basi ramosi, in parte inferiore pilis brevibus dense pubescentes et insuper setis longioribus deorsum vergentibus obsiti, in parte superiore disperse hirsuti vel subglabri; folia radicalia longe petiolata, petiolis basi in vaginam sensim dilatatis, circuitu triangulari-ovata, 7—12 cm longa et 2—6 cm lata tripinnata, lobi primarii petiolulati, lobi ordinis secundi sessiles in lobulos breves pinnatim incisis secti, dense griseo pubescentes, folia caulina pauca, radicalibus similia sed breviora. Umbella 3—5-radiata, basi barbula pilorum munita, radiis inaequilongis, disperse pilosis, involucrum nullum; umbellulae 15-florae, floribus sterilibus intermixtis, foliola involucelli ovata, acuminata, margine scariosa, pilosa in numero 5—7, radiolis breviora; dentes calycini inconspicui, petala alba, dorso hirsuta, apice incisa, in incisura lobulo minuto incurvo praedita, fructus cylindrici, 9—11 mm longi et ad 1 mm lati, jugis crasse filiformibus, stylis erecto-divergentibus, stylopodio conico duplo longioribus.

Habitat. In clivis montanis Iraniae septentrionalis et Turcomaniae.

Typus. Irania. Prov. Khorossan; in rupestribus inter pag. Darbendy et Kuczak. Fr. 12 VII 1925 E. Czerniakowska; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Affinitas. Species nova appropinquat ad *Ch. Borodinii* Alb., sed caulibus foliisque dense pilosis nec glabris distinguitur.

6. *Ch. kiapazi* Woron. sp. nova in Sched. ad Herb. Leninopol.

Perenne; tota planta glabra vel pilis sparsis obsita; radix verticalis vel adscendens, 5 mm crassa; caules numerosi vel pauci, debiles ascendentes, 1—30 cm alti, interdum acaules tantum scapos aphyllus formantes; folia radicalia et caulina inferiora longe petiolata, petioli basi in vaginam oblongam marginibus ciliatam dilatati, lamina circuitu oblonga, bipinnata, lobi primarii petiolulati in lobulos late lineares acutiusculos 2—4 mm longos et 0.5—0.75 mm latos dissecti; folia suprema minora. Umbellae longe pedunculatae, pedunculis 5—12 cm longis, 4—8-radiatae, in diametro 2—3 cm, radiis inaequalibus glabris vel disperse pilosis, postea elongatis; involucrum nullum vel monophyllum, phyllo ovato-oblongo membranaceo glabro vel villosa; foliola involucelli 5—7, ovata, late albo-marginata, acuta vel obtusiuscula, glabra vel ciliata, dorso interdum villosa, reflexa; petala alba, vix emarginata, in incisura lobulo inflexo munita;

91 fructus breviter cylindrici 6 mm longi et 1.5 mm lati, stylopodium applanatum, styli breves, divergentes, juga mericarpii crassiuscule filiformia.

Habitat. In alpinis Caucasi.

Typus. Azerbajdzhan, in monte Kiapaz, alt. 2700—3000 m. 13 VII 1909. A. Schelkovnikov; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Affinitas. Haec species nova valde affinis *Ch. humili* Stev., sed foliolis involucelli radiisque glabris vel subglabris (nec villosis) distinguitur.

7. *Ch. Bobrovii* Schischk. sp. nova.

Bienne; tuber globosum vel oblongo-globosum in diametro 1—1.5 cm; caulis solitarius, erectus, teres, in parte inferiore setis albidis ad 2 mm longis, deorsum vergentibus, dense vestitus, ramosus, 40—60 cm altus; folia radicalia et infima caulina cito emarcida, petiolis longis in vaginam oblongo-lanceolatam sensim dilatatis, caulina media breviter petiolata, petiolis in vaginam dilatatam abrupte transeuntibus, lamina subtripinnata, lobi primarii et secundarii breviter petiolulati, secundarii profunde pinnatim incisi lobulis (vel dentibus) ovatis obtusatis, 7—10 mm longis et 3—5 mm latis; folia suprema ternatim composita, in vagina brevi dilatata sessilia, lobi ultimi ovati vel oblongi, 0.5—1.5 cm longi et 2—5 mm lati, obtusati. Umbellae terminales ignotae, umbellae rameales, 5—7-radiatae, radiis glabris inaequalibus; involucrum nullum, umbellulae 8—10-florae, raro flores omnes fructiferi, saepius floribus fertilibus in umbellula 1—4; foliola involucelli lanceolato-linearum, erecta, glaberrima, anguste albomarginata; petala alba, ad 1 mm longa; fructus oblongo-cylindrici 5 mm longi et 1—1.5 mm crassi; stylopodium breviter conicum, styli stylopodio longiores deflexi, jugis mericarpii obtusis crassiusculis, valliculae brunneo-coloratae.

Typus. Asia media, in jugo Kopet-dagh austro-occidentali, fauces Por-dere in Juglandetis, alt. 1760 m. Fr. 24 VI 1930 E. Bobrov; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Affinitas. Nostra species affinis, ut videtur, *Ch. bulboso* L. et *Ch. caucasica* (Fisch.) Schischk. sed lobis ultimis ovatis vel oblongo-ovatis et floribus fructiferis in umbellulis saepe paucis distinguitur; a *Ch. Meyeri* Boiss. et Buhse stylis deflexis (nec rectis) statim dignoscitur.

8. *KRASNOVIA*¹ M. Pop. gen. nov.

in Flora Alma-Atinsk. Gosud. Zapovednika (1940) 34, nomen generic. et species relata! (Umbelliferae, II E Gymnomestomeae K.-Pol. 2. Careae Adans. em. K.-Pol. Sciadophytorum Systematis lineamenta (1915) p. p. 169 et 181).

Calyces dentes inconspicui (sub lente validissima in tuberculorum minutorum forma visi). Petala alba brevissime papillosa, in eodem flore

¹ Genus in memoriam Viri beati celeberrimi, investigatoris famosi florae Tianschanicae et Caesicae, Javanicae et Japonicae, multarumque aliarum; fundatoris Horti magnifici subtropicalis Batumensis; Magistri nostri in naturae investigandis, Professoris A. N. Krasnov cum maxima pietate dedicavimus.

592 inaequalia, majora ca. 2 mm longa, ovalia, apice retusa, late inflexa, acumine satis longo subulato terminata. Stamina 5 aequalia, filamentis arcuatis petala subaequantibus, antheris late ovalibus 0.7—0.8 mm longis filamento dorso affixis. Discus stylopodii margine crasso undulatus. Fructus 3—4 mm altus, a lateribus paulo compressus, ovato-oblongus, apice breviter crasseque attenuatus, maturus niger et lucidulus, glaber, costis tenuibus acute elevatis breviter mamillato-denticulatis, stylopodio coroniformi parvo undulato stylisque longis deflexis terminatus, in mericarpia dua facile secedens, mericarpis a carpophoro subulato apice breviter bifido mox delabentibus. Mericarpium in sectione transversa pentagonum, pericarpio tenui extus dorso quinque costato, ad latera plano, ventre ad angula externa crassius costato, intus albumine (endospermio) lato ventre late et non profunde exarato et supera sulcam ventralem cellulis parenchymaticis crystallis oxalati calcii destitutis impletum, vittis et stereomis nullis mestomis tenuibus filiformibus in basin jugorum (costarum) sitis. Herba perennis, tubere parvo profunde in terram sepulto, orbiculato. Herba et inflorescentia normalis umbellifera. Caulis plerumque superne ramosus, umbella centrali fructifera, lateralibus masculis.

Genus a *Conopodio* fructu apice in collum attenuato, jugis (costis) mamillato-denticulatis, vittis oblitteratis, a *Conio* radice tuberifero et fructu apice in collum attenuato nigro, a *Chaerophyllo* notis multis tribalibus distinctum.

In Asiae Mediae montibus orientalibus.

Species unica:

K. longiloba (Kar. et Kir.) M. Pop. l. c. (1940) 34.

SCALIGERIA DC.

9. *S. platyphylla* Korov. sp. nova.

Biennis; glaucescens, vix scabrida; tuber ovatum ad 5 mm crassum; caulis 50 cm altus, teres, sulcatus, a medio vel infra ramosus; folia radicalia fere glaberrima, petiolis basi dilatatis instructa, caulina sessilia vaginis brevibus triangularibus, lamina tripinnata lobi ultimi filiformes, scabriusculi ad 5 mm longi; folia suprema et ramealia ad vaginam ovato-lanceolatam, acutam albomarginatam reducta. Umbellae numerosae terminales et laterales, breviter pedunculatae, 5—7-radiatae, radiis tenuibus inaequalibus, 5—15 mm longis; foliola involucri 5, tota membranacea, oblonga, trinervia; unbellulae 10-florae, foliola involucelli 5—6, oblongo-ovata, fructificationis tempore deflexa, trinervia, membranacea, pedicellos aequantia; dentes calycini deficientes, stylopodium conicum, styli stylopodio breviores; fructus oblongo-ovati, pedicellis subaequilongi, pallide hepatici, 2.5 mm longi, mericarpia a dorso vix compressa, jugis indistinctis, nitentia, vix rugosa, vittae angustissimae, interjugales ternae, comisurales 6.

Habitat. In clivis collium in Pistacietis Turcomaniae montanae.

Typus. Asia media, Turcomania. In ditioe Kuschka, montes Badghyz; in Aschabad conservatur.

Affinitas. Valde affinis *S. glaucescenti* (DC.) Boiss., sed umbellis in inflorescentiam paniculiformem (nec thyrsiodeam) dispositis et tuberibus ovatis (nec oblongis) diversa est.

10. *S. Korovinii* Bobr. sp. nova.

Glaberrima pallide viridis, 40—50 cm alt., tubere elongato-ovali, collo fibroso, caule sulcato usque a basi ramoso; folia radicalia ambitu lanceolata 10—15 cm lg., 2—3 cm lt. glauca vel pallide violacea, petioli laminis subaequales basi dilatati; lamina bipinnata segmentis cuneatis profunde tripartitis, lobulis linearibus; folia caulina minora, supera ad vaginas angustas reducta. Umbella 2—3 cm diam. inaequaliter 3—5-radiata, involucri phyllis 3—5 lanceolatis; umbellula 10-flora, involucelli phyllis lanceolatis duplo ea brevioribus; petala 1.4 mm lg. obovata, stylopodio depresso conico, ovarium elongatum basi angustatum, vittae plurimae tenuissimae, fructus maturi ignoti.

Habitat. Turcomania occidentalis montana.

Typus. Montes Balchany Majores, declivia australia in schistosis, ca. 600 m s. m. 4 VI 1928 leg. E. Bobrov et A. Jarmolenko; in Lenino-poli asservatur.

Affinitas. *S. elatae* Boiss. et Hausskn. valde affinis differt caule non crasso subpatente ramoso foliorum segmentis tripartitis, lobulis sublinearibus non setaceis.

DANAA All.

11. *D. denaensis* (B. Fedtsch.) Schischk. — *Physospermum denaense* B. Fedtsch. in Sched. in Herb. Leninopol.

Perennis; caulis intus solidus, longitudinaliter striatus, cum foliis glaberrimus, ramosus, ad 1 m altus; folia caulina petiolata petiolis laminam aequantibus basi in vaginam amplexicaulem abrupte dilatatis; lamina triangulari-ovata 20—30 cm longa et 10—20 cm lata, subtripinnata; lobi primarii longe, lobi secundarii breviter petiolulati; lobi ultimi sessiles vel plus minusve decurrentes, late ovati, 3—7 cm longi et 2.5—4 cm lati, inaequaliter lobati lobuli dentati, dentibus paucis apice rotundatis. Umbellae 10—12-radiatae, radiis subglabris postea 9—12 cm longis; involucra et involucella nulla; umbellulae 8—10-florae, radiolis tenuibus, fructiferis 1.5—4 cm longis; flores ignoti; fructus didymi, 3 mm longi et 5 mm lati, stylopodium breviter conicum, styli reflexi stylopodio duplo longiores; mericarpi subsphaeroidea, jugis filiformibus subindistinctis, vittis fusco-coloratis, carpophorum integrum vel apice bifidum.

Typus. Asia media. Jugum Hissaricum, in faucibus fl. Sangardak. Fr. 4 VI 1913. A. Michelson; in Herbario Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Affinitas. Affinis est *D. nudicauli* (M. B.) Grossh., sed caulibus foliosis statim dignoscitur.

AULACOSPERMUM Ldb.

12. Subgen. 1. **Eaulacospermum** Schischk. subg. n.—Petala alba, foliola involucelli umbellulae subaequilonga.

13. Subgen. 2. **Trachydiella** Schischk. subg. n.—Petala flavida, foliola involucelli umbellula multo breviora.

CRYPTODISCUS Schrenk

14. **C. arenarius** Schischk. sp. nova.

Perennis; radix verticalis ad 1 cm crassa, collum residuis fibrosis foliorum emortuorum tectum; caulis angulatus subverticillatim ramosus, in parte inferiore pilis densis mollibus vestitus, superne subglaber, 30—40 cm altus; folia radicalia petiolis longis dense pubescentibus instructa in vaginam longam sensim dilatatis; lamina triangularis, tripinnata 15—20 cm longa et 10—12 cm lata, lobi primarii petiolulati, lobi secundarii sessiles, lobi ultimi lineares 2—7 mm longi, 0.5 mm lati. Umbellae 5—6 radiatae, radiis postea glabris, foliola involucri 2—5, linearia, dense pubescentia, foliola involucelli 3—5 eis similia; flores ignoti; fructus didymi 10—12 mm longi et 15 mm lati; merocarpia hemisphaerica, glabra et laevia.

Typus. Asia Media. Arenae Mujunkum pars austro-orientalis, in artemisieto-graminetis collium arenosorum. Fr. 14 VI 1935 A. Gael et M. Kolikov; in Herb. Inst. bot. nom. V. Komarovii Ac. sc. URSS conservatur.

Affinitas. Affinis est *C. didymo* (Rgl.) Korov. et *C. cachroidi* Schrenk sed ab ambobus foliis ob pilos densos griseis (nec glabris vel pilis sparsis vestitis) sat differt.

PRANGOS Lindl.

15. **P. isphairamica** B. Fedtsch. sp. nova.

Perennis; caules angulati a medio ramosi, 60—80 cm longi, ramis elongatis sursum vergentibus; folia radicalia petiolata, petiolis 20 cm longis basi brunneo-membranaceis; lamina circuitu late ovata 30—35 cm longa et 20—25 cm lata ternatim secta, lobi primarii breviter petiolulati bipinnatim secti, lobuli ultimi patuli, leviter aspera vel subglabra, linearia, plana, in acumen breve attenuata, 4—5 mm longa et ad 1 mm lata; folia caulina minora, sessilia. Umbellae 8—15-radiatae; involucri et involucelli phylla lineari-lanceolata, breviter; pedicelli fructibus longiores. Fructus a dorso subcompressi, oblongo-ovales 12—14 mm longi, 7 mm lati.

Typus. Asia media, Jugum alaicum in systemate flum. Isphairam, in rupestribus ad ripam flum. Iniczke, Drobov; in Herb. inst. bot. nom. V. Komarovii Ac. sc. URSS conservatur.

Affinitas. Affinis est *P. tschimganicae* B. Fedtsch. sed lobis ultimis 4—5 mm longis (nec 6—16 mm), patulis (nec sursum vergentibus) sat diversa est.

BUPLEURUM L.

16. **B. czimanicum** Lincz. sp. nova (Subgen. *Bupleurotypus* K.-Pol., sect. *Eubupleurotypus* K.-Pol.).

Perenne, caudice plus minusve crasso, lignoso, pluriceps. Caules plus minusve numerosi (2—10), usque 50—100 cm alti, firmi, recti, superne sat breviter ramosi et interdum vix flexuosi. Folia (caulesque) glauco-viridia, rigidiuscula, 5—7-nervia, nervis longitudinalibus subtus valde prominentibus, nervillis paucis irregulariter dictyodromis; radicalia — basin versus ut in petiolum plus minusve longum sensim angustata, sat brevia, late oblanceolata (subspathulata), apice rotundata vel obtusiuscula, 6—9 cm (cum petiolo) longa et ca. 1 cm lata, vel longiora et angustiora usque ad oblongo-lanceolata vel linearia, apicem versus sensim acuminata, 16—18 cm longa et 0.5—1 cm lata; caulina inferiora radicalibus similia, brevius petiolata, lanceolata vel anguste (sublineari) lanceolata, apicem versus sensim acuminata, 10—15 cm longa et 0.5—0.8 cm lata; caulina media et superiora inferioribus conspicue angustiora, sessilia, lanceolata vel lineari-lanceolata, apicem versus sensim angustata, in triente superiore vel parte media latiora, 3—7 cm longa et 0.3—0.6 cm lata; summa — parva, subinconspicua, linearia usque lineari-subulata, longe acuminata, 0.5—1.5(2.5) cm longa et 1—2 mm lata. Umbellae numerosae, brevipedunculatae, inflorescentiam laxam, plus minusve anguste paniculatam subaphyllam formantes, sat parvae (laterales terminalibus multo minores, laterales rameales — vulgo abortivae, pauciradiatae, subsessiles); terminales — radiis 8—10(12), interdum valde inaequalibus, vix curvatis, sat tenuibus, plus minusve late divergentibus, (0.5)1—1.5(2) cm longis; involucri phylla 4—6, adpressa, inaequalia, rigida, lanceolata, acuminata, 2—3 mm longa; involucelli phylla 5, adpressa, inaequalia, rigida, crassiuscula, late lanceolata vel subovata, acuminata 3-nervia, 1.5—2 mm longa et ca. 1 mm lata, umbellulis floriferis multo (subduplo) breviora; flores in umbellula (5)10—15, breviter (1—1.5 mm) pedicellati; petala flava, stylopodia cinnamomea (?); fructus oblongo-elliptici, albo-brunnei, nitidi, ca. 4 mm longi, jugis filiformibus, obtusis, pallidis, valleculis 4-sulcatis, 3-vittatis. Floret VII—VIII.

Habitat. Asia Media; in regione silvatica montium Tjan-Schan occidentalis, ad declivia sicca (rubro-argillosa).

Typus. Tjan-Schan occidentalis, Czimgan, 16 VII 1897, leg. O. Fedtschenko; in Herb. Inst. Bot. Ac. Sc. URSS (Leningrad) asservatur.

Affinitas. Affine est *B. Kryloviano* Schischk. a quo habitu xeromorphico — foliis angustioribus, caulibus minus foliatis, inflorescentiis manifestis, subaphyllis, anguste paniculatis nec non umbellis terminalibus minoribus et umbellis lateralibus abortivis numerosissimis, involucri et involucelli phyllis minoribus, adpressis (nec reflexis) etc. eximie differt.

17. *B. badachschanicum* Lincz. sp. nova (Subgen. *Bupleurotypus* K.-Pol., sect. *Eubupleurotypus* K.-Pol.).

Perenne. Caules (ut videtur numerosi) usque 40 (—60?) cm alti, enues, plus minusve angulato-flexuosi, parte superiore plus minusve longe, remote ramosi. Folia (caulesque) glaucescenti-viridia, rigidiuscula, 5-nervia, nervis longitudinalibus subtus prominentibus, nervillis paucis irregulariter dictyodromis; caulina inferiora basin versus in petiolum plus minusve longum sensim angustata, lanceolata vel lineari-lanceolata, apicem versus sensim acuminata et cuspidata, 6—8 cm (cum petiolo) longa et 0.5—0.8 cm lata, in triente superiore vel in parte media latiora; caulina media inferioribus similia, superiora parum decrescentia, petioli brevibus munita vel plane sessilia; summa (ramealiaque) — sessilia, minora et angustiora — linearia, 0.5—1(3) cm longa et 1—2 mm lata. Umbellae haud numerosae, sat parvae (laterales terminalibus conspicue minores); terminales 5—6-radiatae, radiis valde inaequalibus, vix curvatis, tenuibus, plus minusve inter se contractis, (0.3)1.5—2(2.5) cm longis; involucri phylla 4—6, adpressa, inaequalia, rigidiuscula, lanceolata vel anguste-ovata, acuminata, 1—3 mm longa; involucelli phylla 5, adpressa, inaequalia, crassiuscula, late-lanceolata vel subovata, acuminata, 3-nervia, ca. 1 mm longa et 0.5 mm lata, umbellulis floriferis subduplo breviora, radios fructiferos subaequantia; flores in unaquaque umbellula 10—15, breviter (ca. 1 mm) pedicellati; petala flava, stylopodia cinnamomea (?); fructus (immat.) oblongi, ca. 2 mm longi... Floret VIII—IX(?).

Habitat. In montibus Badachschan Afghanistanae septentrionaliorientalibus (necnon mont. Darvasici Tadshikistaniae?), ad declivia saxosa (?).

Typus. „Darwas: Omar ad fl. Pändsch ripam sinistram, IX 1882“, leg. A. Regel; in Herb. Inst. Bot. Ac. Sc. URSS (Leningrad) asservatur.

Affinitas. *B. czimganico* Lincz. affine est, sed caulibus plus minusve longe ramosis, umbellis exiguis (nec numerosis) inflorescentias non formantibus, foliorum forma etc. bene differt.

TRINIA Hoffm.

18. Sect. 1. *Leptopus* Schischk. sect. nov. — Pedicelli fructiferi tenuiter filiformes, longi, fructus parvuli 2—3 mm longi.

Species 4: *T. polyclada* Schischk., *T. ucrainica* Schischk., *T. multicaulis* (Poir.) Schischk., *T. Stankovii* Schischk. in Europa orientali et Sibiria occidentali incolae.

19. Sect. 2. **Pachypus** Schischk. sect. nov. — Pedicelli fructiferi plus minusve incrassati, vulgo breves; fructus 3—5 mm longi.

Species 4: *T. hispida* Hoffm., *T. muricata* Godet, *T. leiogona* (C. A. M.) B. Fedtsch., *T. Kitaibelii* M. B. in Tauria, Caucaso, Europa austro-orientali, Sibiria maxime occidentali crescunt.

20. **ORMOPTERUM** Schischk. gen. nov.

Dentes calycini inconspicui, petala alba, ovata, apice acutiuscula, deinde reflexa; fructus oblongi, stylopodium breviter conicum basi dilatatum; styli crassiusculi, reflexi, stigmatibus capitato; juga mericarpii quinque, filiformia parum conspicua plicis transversis undulatis suberosis eleganter tecta, valliculae univittatae, commissura bivittata. Herba biennis, foliis tripinnatis, radice tuberosa.

Genus habitu valde affine *Hyalolaenae* Bge., sed jugis mericarpii non alatis, plicis transversis undulatis suberosis tectis statim dignoscitur. Non dissimile atque *Szowitsiae* Fisch. et Mey. sed radice tuberosa, structura fructuum diversum est.

Area geographica. Asia media (Turcomania). Generis typus: *Ormopterum turcomanicum* (Korov.) Schischk.

BUNIUM L.

21. **B. scabrellum** Korov. in Grossg. Opred. rast. Kavk. (1949) 227.

Perenne, pallide-viride, in parte superiore scabrellum; tuber sphaeroideum, in diametro 10 mm; caulis in parte inferiore teres, sulcatus, in parte superiore angulatus et ad apicem acute costatus, inanis, flexuosus, fere a medio ramosus, 30 cm alt.; folia radicalia bipinnata lobi primarii distantes, lobi ultimi oblongo-lineares 10 mm longi et 3 mm lati; folia caulina inferiora radicalibus similia, folia media et suprema in vaginis angustis lanceolato-linearibus sessilia, lamina eorum in segmenta 1—3 elongata, linearia, basi angustata usque ad 4 cm longa, secta. Umbellae longe pedunculatae, pedunculis in parte superiore scabrellis, 5—8-radiatae; folia involucri 1—4, lineari-subulata, inaequalia, submembranacea; radii inaequales 10—20 mm longi, acute costati, scabri; umbellulae 10—13-flo-rae, foliola involucelli 5, lineari-subulata radiolis duplo breviora. Flores polygami interiores masculi, exteriores hermaphroditi; dentes calycini deficientes, petala alba, obcordata, cacumine inflexo, 1 mm longa; stylopodium breviter conicum, styli patuli diametro stylopodii aequales; fructus oblongi, pedicellis tenuibus aequilongi, 2.5 mm longi; mericarpia subcylindrica jugis filiformibus, vittis inter jugis solitariis, commissuralibus binis.

Habitat. in abruptis saxosis alt. ca. 2200 m in montibus Taly-schensibus.

Typus. Transcaucasia, Talysch, im subalpinis versus pag. Drych (Suvant) 18 VI 1830 C. Meyer; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Affinitas. Appropinquat ad *B. persicum* (Boiss.) B. Fedtsch. sed radiolis fructum subaequantibus (nec eo duplo longioribus) et pedunculis in parte superiore, radiis radiolisque scaberulis sat differt.

MURETIA Boiss.

22. Sect. 1. **Eumuretia** Korov. sect. n. — Fructus cylindrici, elongati; folia vaginis dilatatis destituta.

23. **M. oeroilanica** Korov. sp. nova.

Biennis, glaucescens, subglabra; tuber ovale; caulis sulcatus, 80 cm altus a medio ramosus, ramis incrassatis; folia fere tota radicalia, rosulam formantia in petiolis brevibus dilatatis marginibus scabridulis, lamina circuitu ovato-lanceolata multoties (3—4) pinnatim secta, lobis ultimis linearibus 2—3 mm longis, dense congestis folia caulina diminuta, summa laminae destituta. Umbellae 4—5-radiatae, radiis inaequalibus 5—25 mm longis; foliola involucri, 3—5, oblongo-lanceolata; umbellulae parviflorae, foliola involucelli oblongo-ovata, membranacea, umbellulam tegentia; petala late ovata, cacumine acutato inflexo; fructus (non maturi) oblongo-cylindrici, jugis prominulis, 2.5 mm longi; vittae numerosissimae.

Habitat. In arenis gypsaceis in zona semideserti montani Turcomaniae.

Typus. Asia media, Turcomania. Montes Badghyz, in arenis gypsaceis semideserti montani; in Herb. Universitatis in Taschkent conservatur.

Affinitas. Valde affinis *M. transitoriae* Korov., sed caulibus subaphyllis, foliis fere tantum rosularibus diversa est.

24. **M. transcaspica** Korov. in Schedis ad Herb. Fl. As. Med. X (1926) 10, nom. nud.

Biennis, pallide-virens, vix scabridula; tuber oblongum, caulis albo-lineatus, ramosus, ramis strictis, ad 1 m altus; folia radicalia cito emarcida, caulina breviter petiolata, lamina circuitu oblongo-ovata, decomposita, lobis ultimis anguste linearibus, folia suprema ad vaginam brevem reducta. Umbellae 3—5-radiatae, radiis ad 1.5 cm longis, foliola involucri tria, oblonga; umbellulae parvae, foliola involucelli elliptica, membranacea, brunnea, umbellulas aequantia; petala late obovata, cacumine acuminato inflexo; fructus immaturi obovati; vittae valliculares solitariae latae, jugales tres angustae, commissurales binae.

Habitat. In promontoriis Turcomaniae montanae.

Typus. Asia media, Turcomania Montes Kopet-dagh; in Herb. Universitatis in Taschkent conservatur.

Affinitas. Affinis est *M. luteae* (M. B.) Boiss. sed umbellis 3—5-radiatis (nec 5—7), radiis crassiusculis (nec tenuibus) 15 mm (nec 20) longis, petalis cito deciduis (nec diu persistentibus) sat differt.

PIMPINELLA L.

25. Sect. 1. **Eutragium** Schischk. sect. n. — Plantae perennes interdum in parte inferiore lignescentes, stylopodium pulviniforme.

26. Sect. 2. **Tragiella** Schischk. sect. n. — Plantae biennes, stylopodium conicum.

27. Sect. 3. **Anisoides** Schischk. sect. n. — Plantae annuae, tenuiter breviterque puberulae.

28. Sect. 4. **Polycladum** Schischk. sect. n. — Plantae perennes herbaceae a basi ramosissimae; involucria et involucella 5—7-phylla.

REUTERA Boiss.

29. **R. Bobrovii** Woron. in sched. ad Herb. Inst. botanici Ac. Sc. URSS.

Planta 30—50 cm alt. e rhizomate indurato multicaulis, caulibus inferne adscendentibus; caules brevissime velutini a basi divaricatim ramosi, solitarii simplices; folia radicalia plurima elongata 2—10 cm lg., 0.5—2 cm lt., petioli laminis subaequales, lamina pinnata vel bipinnata segmentis petiolulatis late cuneatis breviter pilosis trilobulatis lobulis sublanceolatis; folia caulina minora segmentis angustis sublinearibus, superiora ad vaginas reducta. Umbella 1—1.5 cm diam. 3—4-radiata, radiis subaequilongis breviter pubescentibus; involucrium involucellumque deficiunt; calycis dentes inconspicui; petala viride-luteola apice vix emarginata dorso dense pubescentia; fructus idem pubescentes, stylopodiis applanati-conicis stylisque stylopodio sesqui—duplo longioribus superato, fructus maturi ignoti.

Habitat. Turcomania occidentalis montana.

Typus. Montes Balchany Majores, declivia septentrionalia, in rupibus, 800 m s. m. 28 VI 1928, leg. E. Bobrov; in Leninopoli conservatur.

Affinitas. Valde affinis *R. dichotomae* Boiss. et Hausskn.; species balchanica tamen gracilior a basi divaricatim ramosa foliorum segmentis minoribus lobulis sublanceolatis.

30. **ALBOVIA** Schischk. gen. nov.

Flores hermaphroditi, dentes calycini inconspicui, petala alba, emarginato-biloba, externa in umbellula vix radiantia; fructus subdidymi, ovato-globosi a lateribus paullulum compressi, mericarpia indistincte rugosa, jugis subobsoletis vel prominulis, valleculis 1—3-vittatis, stylopodia mamillaria, styli longi deflexi; albumen in latere interiori concavum bisulcatum; car-

600 pophorum bifidum. Herbae perennes foliis rotundis vel trisectis, radice elongato fibroso.

Genus novum *Albovia* Schischk. affine *Scaligeriae* DC. et *Pimpinellae* L., a priore vittis latiusculis (nec tenuissimis) radicibus elongatis fibrosis (nec rapiformibus) foliolis involucris et involucelli nullis, foliis indivisis vel in segmentis paucis ovatis sectis (nec decompositis), distinguitur; a posteriore albumine latere interiori plus minusve concavo bisulcato (nec plano) differt.

Species 4: *A. tripartita* (Kalenicz.) Schischk., *A. lazica* (Boiss.) Schischk., *A. podagrarioides* (Boiss. et Bal.) Schischk. et *A. cretica* (Urv.) Schischk. in Caucaso, Asia minore et Balcano obviae.

AEGOPODIUM L.

31. **Ae. tadshikorum** Schischk. sp. nova.

Perenne; tota planta glaberrima, caulis sulcatus, superne parum ramosus, 70—100 cm altus, folia radicalia longe petiolata, petiolis 10—20 cm longis basi in vaginam sensim dilatatis; lamina late triangularia 10—20 cm longa et 15—25 cm lata ternata vel bipinnatim secta, lobi primarii petiolulati foliola integra vel 2—3-lobata, apice acuminata marginibus acute serrata, 4—11 cm longa et 2—6 cm lata; folia caulina in numero 2—3 minora et minus dissecta in vaginis dilatatis sessilia. Umbella terminalis 15—20-radiatus, in diametro 5—8 cm, radiis glabris vel subinconspicue asperulis, umbellis lateralibus minoribus; involucrum et involu-cellum nullum; umbellulae in diametro 1—1.5 cm; dentes calycini abortivi, petala alba, 2 mm longa, fructus ovals 4—6 mm longi et 3 mm lati, stylopodium conicum, styli stylopodio longiores deflexi.

Habitat. In piceetis, juglandetisve montanis ad ripam rivulorum in Pamiro-Alai et Tjan-Schan.

Typus. Asia media. Baldzhuan, in faucibus fl. Ach-su. Fr. 16 VII 1897 V. Lipsky; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Affinitas. Nostra species valde affinis *A. latifolio* Turcz., sed foliolis ovatis acuminatis (nec subrotundatis), radiis numerosioribus, 15—20 (nec 13—16) subglabris et fructibus 4—7 mm long. sat distat.

LIBANOTIS L.

32. **L. dolichostyla** Schischk. sp. nova.

Perennis; rhizoma adscendens, caules pauci basi vestigiis brunneis fibrosis foliorum emortuorum tecti, intro inanes, glabri, rotundi, tenuiter sulcati, superne vix ramosi, 35—100 cm alti; folia radicalia oblonga, petiolata, petiolis basi in vaginam dilatatis, lamina sublongioribus; lamina 8—10 cm longa et 2.5—3.5 cm lata, bi- vel fere tripinnatim secta, lobi

601 primarii 7—8-parii, inferiores distantes sessiles, pinnatim secti, lobuli lanceolato-lineares vel oblongi, 3—6 mm longi et 1—1.5 (2) mm lati, apice mucronulati, glabri vel marginibus indistincte asperuli; folia caulina pauca, radicalibus similia sed minora, in vaginis dilatatis sessilia. Umbellae 15—16-radiatae, radiis subaequalibus glabris in diametro 2—3 cm; foliola involucri 5—7, linearia albo-marginata longe acuminata; umbellula in diametro ad 6 mm, foliola involucelli 7—8, lanceolato-linearia, acuminata albo-marginata, umbellulam subaequantia; dentes calycini lineari subulati; petala alba, dorso glaberrima, late ovata, apice emarginata, ad 1.5 mm longa; fructus ovati, glabri, compressi, 4 mm longi et 2 mm lati, jugis dorsalibus filiformibus, stylopodium breviter conicum, nigricans, styli erecti vel divergentes, 3 mm longi.

Habitat. In subalpinis montium Pamiro-Alaj et Tjan-Schan.

Typus. Asia media. Montes Tjan-Schan. Ad ripam fl. Karakol occident. Fl. et fr. 22 VII 1908, R. Roshevitz; in Herb. Inst. bot. nom. V. Komarovii Ac. sc. URSS conservatur.

Affinitas. Nostra species nova appropinquat ad *L. condensatam* (L.) Crantz, sed fructibus glaberrimis (nes dense pubescentibus statim dignoscitur).

33. *L. Schrenkiana* C. A. M. sp. nova in Herb. Leninop.

Perennis, radix 1.5—2 cm crassa; collum residuis fuscobrunneis foliorum emortuorum tectum; caules solitarii vel pauci, erecti, tenuiter costati, fere a medio ramosi, in parte inferiore brevissime et dense puberuli, 40—110 cm alti; folia radicalia circuitu oblonga longe petiolata, petiolis breviter pubescentibus, lamina 8—20 cm longa et 2.5—3.5 cm lata, bi- vel subtripinnata; lobi primarii sessiles vel inferiores petiolulati, lobi secundarii lanceolati, acuti, integri vel profunde incisi, marginibus et venis in latere inferiore scabridis; folia suprema radicalibus similia sed minora, in vagina dilatata sessilia. Umbella centralis 18—25-radiata, radiis in latere superiore pubescentibus, umbellae laterales minores, 10—20-radiatae; involucrum nullum vel oligophyllum, umbellulae multiflorae, in diametro ad 1 cm, radiolis pubescentibus; foliola involucelli 10—11, linearia vel anguste lanceolata breviter puberula, herbacea, umbellulis subaequalia; dentes calycini triangulari-lanceolati, cito decidui, petala dorso glaberrima, ovata, fructus ovati 2 mm longi et 1 mm lati, dense puberuli, stylopodium breviter conicum, styli divergentes vel deflexi stylopodio longiores.

Habitat. In clivis herbosis montanis, ad rupes et in fruticetis montium Dzhungarski Alatau, Tjan-Schan et Pamiro-Alai.

Typus. Species e seminibus, a cl. Schrenkio in montibus Asiae mediae collectis in Horto Petropolitano culta et a cl. Meyero in herbario nominata adhuc non descripta est; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

602 Affinitas. Affinis est *L. condensatae* (L.) Crantz sed stylis reflexis (non erectis vel divergentibus) brevibusque statim dignoscitur.

34. Sectio **Pseudolibanotis** Schischk. sect. nova. — Caules numerosi subaphylli, diffusi vel ascendentes, 4—20 cm longi.

Species 2: *L. setigera* (Korov.) Schischk. et *L. calycina* Korov. in rupestribus alpinis vel subalpinis jugi Tjan-Schan occidentalis incolae.

35. Sectio **Schultziopsis** Schischk. — Caules erecti foliosi; umbella compacta subglobosa vaginis rotundis foliorum summorum circumdata.

Species unica *L. monstrosa* (Willd.) DC. in pratis alpinis et subalpinis montium altaicorum sajanensiumque Sibiriae incola.

SESELI L.

36. **S. pauciradiatum** Schischk. sp. nova. — *S. tortuosum* Ldb. Fl. Ross. II, 276 quoad pl. taur.; Boiss. Fl. or. II. 964 quoad pl. taur.; Пoсср. Фл. Кавк. III, 166, pro minima parte. — *S. tortuosum* β. *tauricum* DC. Prodr. IV (1830) 148, non *S. tauricum* Link.

Perenne, radix adscendens, 8 mm crassa, collum residuis foliorum emortuorum dense vestitum; caules solitarii 20—40 cm alti et 3—4 mm crassi, glabri, tenuiter costati, fere a basi ramosi; folia radicalia numerosa, circuitu ovata, 10—15 cm longa et 5—10 cm lata, tripinnata in petiolis basi in vaginam dilatatis; lobi ultimi lineares 0.3—2 cm longi et 0.5—1 mm lati, acuti subtus uninervi, marginibus et nervo medio vix asperuli, folia caulina minora et minus secta, suprema usque ad vaginam reducta. Umbellae 5—8-radiatae, radiis costatis, crassiusculis, latere superiore asperulis, in diametro 1—3 cm; involucrium nullum; umbellulae multiflorae, densae, subsphaeroideae, in diametro 3—4 mm; foliola involucelli 7, lanceolato-linearia, albomarginata, acuminata umbellulam subaequantia, radioli glabri, flori aequales vel eo duplo longiores; dentes calycini breves; fructus ovati 2.5 mm longi et 1.5 mm lati, densiuscule hirsuti; stylopodium breviter conicum, styli deflexi stylopodio longiores, juga mericarpii filiformia.

Habitat. In clivis argillosis et in silvis collucatis Tauriae.

Typus. Tauria meridionalis. In jugo Karadag, in cacumine montis Karagacz. Fl. 20 IX 1928. A. Krystofovicz; in Herb. Inst. bot. nom. V. Komarovii Ac. sc. URSS conservatur.

Affinitas. Nostra species valde affinis *S. campestri* Bess., sed umbellis tantum 5—8-radiatis (nec 7—15), umbellulis parvis 3—4 mm in diametro (nec 5—8 mm) distinguitur.

37. **S. songoricum** Schischk. sp. nova.

Perenne; radix crassa, multiceps; caules pauci interdum numerosi. erecti, superne ramosi, cum foliis brevissime puberuli 25—45 cm alti; folia radicalia numerosa, petiolis laminae aequilongis vel brevioribus

603 *longioribusve*, basi sensim in vaginam dilatatis; lamina oblonga, 3—8 cm longa et 0.5—2 cm lata bi-vel tripinnata, lobi ultimi 2—5 mm longi et 0.5—1 mm lati breviter mucronati; folia caulina pauca (1—3), radicalibus similia sed minora, in vagina dilatata sessilia. Umbellae 5—10-radiatae, radii inaequalibus dense pilosis, foliola involucri 3—5, ovoidea, acuminata, dense pubescentia; umbellulae multiflorae, in diametro ad 1 cm, foliola involucelli 11—13, ovato-lanceolata, acuta, anguste albo-marginata, dorso breviter denseque pubescentia, basi inter se coalita; dentes calycini triangulares, acuti, petala alba, dorso glaberrima, cacumine inflexo; fructus immaturi dense pilosi, stylopodium breviter conicum, styli deflexi, stylopodio longiores, non raro violaceo-colorati.

Typus. Dzhungarski Alatau, Chaptagai meridionalis, ad ripam affluentis contra Karaschar, alt. ca. 2400 m Fr. 30 VIII 1879 A. Regel.

Affinitas. Affine est *S. Abolinii* (Korov.) Schischk. sed foliolis involucelli inter se basi concretis (nec liberis) distinguitur.

38. ***S. Andronakii*** Woron. sp. nova in Sched. ad Herb. Leninopol.

Perenne; radix verticalis, ad 10 mm crassa, collum residuis brunneis foliorum emortuorum tectum; caulis solitarius, 40—140 cm altus et 1.5 cm crassus, solidus, glaber, erectus, flexuosus, tenuiter sulcatus, a medio ramosus; folia radicalia numerosa, glaucescentia, breviter petiolata, petiolis basi in vaginam dilatatis, lamina late obovata, 25—30 cm longa et 20 cm lata, decomposita, lobi ultimi lineares vel anguste lineares, 1—3 cm longi et 0.5—1 mm lati, marginibus revolutis; folia caulina minora et minus dissecta, subsessilia vel petiolis brevibus dilatatis instructa. Umbellae numerosae 5—8-radiatae, in diametro 2—4.5 cm, radiis inaequalibus, in parte superiore scabridis, costatis; involucrum nullum; umbellulae 4—6 mm in diametro, floribus aggregatis, pedicellis breviter pubescentibus, flore longioribus vel eum aequantibus; foliola involucelli 10—11, marginibus membranacea ciliataque, umbellulam subaequantia; dentes calycini inconspicui; petala alba dorso glaberrima ad 1 mm longa; ovarium dense albido-pubescentia; stylopodium applanato-conicum; fructus ignoti.

Habitat. In rupestribus Turciae septentrionalis finitimae URSS.

Typus. Turcia, prov. Artvin, in rupestribus non procul ab oppido Olty ad pag. Lomaschen; in Herb. Inst. bot. nom. V. L. Komarovii Ac. Sc. URSS conservatur.

Affinitas. Valde affine *S. arenario* M. B., sed pedicellis florem subaequantibus (nec duplo triplove longioribus), umbellis 5—8-radiatis (nec 8—15) distinguitur.

39. Sect. 4. ***Macrostylopodium*** Schischk. sect. n. — *Stylopodium* pyramidalis-conicum, dimidio fructus aequale, styli stylopodio breviores, reflexi.

40. Sect. 6. **Pseudosilaus** Schischk. sect. n.—Fructus oblongi, glaberrimi, pedicelli fructiferi deflexi; involucrum et involucellum adsunt.

SELINUM L.

41. **S. Kultiassovii** Korov. sp. nova.

Perenne; tota planta glaberrima, caulis teres, tenuiter costatus, superne paullulum ramosus, 70 cm altus; folia radicalia longe petiolata, petiolis 10—15 cm longis, lamina ovata vel oblongo-ovata, 10—12 cm longa et 6—8 cm lata, bipinnata, lobi primarii breviter petiolulati, distantes, lobi secundarii sessiles, ovati, marginibus inaequaliter dentati, 2—3 cm longi et 1—1.5 cm lati; folia caulina inferiora radicalibus similia, suprema minora et minus dissecta. Umbellae 8—13-radiatae, radiis inaequilongis, in diametro 4 cm, involucrum nullum; umbellulae in diametro 0.8 cm, foliola involucelli linearia acuminata radiolis breviora; dentes calycini triangulares, acuti; petala albida, ad 1 mm longa, apice emarginata lobulo inflexo munita; fructus immaturi ovati, stylopodium breviter conicum basi dilatatum undulatum styli reflexi, stylopodio 1½-plo longiores.

Habitat. In pratis udis in monte Talasski Alatau Asiae Mediae.

Typus. Asia media. Montes Talasski Alatau, in pratis udis ad ripam fl. Dzhebog y-su, alt. ca. 2200 m. Fl. et fr. immat. 13 VIII 1931 n° 1053 N. Pavlov; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Affinitas. Affine est *S. tianschanico* Korov. sed involucro nullo vel monophyllo statim dignoscitur.

LIGUSTICUM L.

42. Subgen. 4. **Pachypleuroides** Schischk. subg. n.—Petala alba, foliola involucri et involucelli numerosa, ovato-lanceolata, scabrida, marginibus late membranacea, caulis sat altus.

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„ <i>japonica</i> (Houtt.) DC.	154	<i>Tragoselinum</i> Mill.	422, 427
„ <i>lanuginosa</i> Clairv.	138	<i>Tragoselinum</i> (Mill.) Schischk., subgen.	427
„ <i>leptophylla</i> (L.) Rehb.	163, 164	<i>Tragoselinum</i> Drude, sect.	427
„ <i>litoralis</i> Calest.	171	„ <i>Angelica</i> Lam.	455
„ <i>macrocarpa</i> Gaertn.	93	„ <i>magnum</i> Moench	431
„ „ C. Melv.	156	„ <i>majus</i> Lam.	431
„ <i>microcarpa</i> Bess.	156	„ <i>minus</i> Lam.	427
„ <i>neglecta</i> Roem. et Schult.	160	„ <i>saxifragum</i> Moench	427
„ „ var. <i>pauciradiata</i> Grossh.	161	Trinia Hoffm.	349
„ <i>nodiflora</i> Bub.	162	„ subgen. <i>Eu-Trinia</i> Drude	349
		„ „ <i>Rumia</i> Drude	358

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Trinia sect. I. <i>Eutrinia</i> Drude	350	<i>Turgenia heterocarpa</i> DC.	178
„ <i>crithmifolia</i> Wolff	358	„ <i>latifolia</i> (L.) Hoffm.	174
„ <i>glauca</i> auct.	352	Umbelliferae Moris.	36
„ <i>guberlinskensis</i> Less.	356	Umbelliflorae Bartel., ordo	1
„ <i>Henningii</i> Hoffm.	352	<i>Uraspermum</i> Nutt.	148
„ „ auct.	352	„ <i>aristatum</i> Kuntze	149
„ <i>hispida</i> Hoffm. var. <i>glabra</i> (Henning) Thell.	365	<i>Valerianella exscapa</i> Stev.	274
„ <i>Hoffmanni</i> Boiss.	357	<i>Visnaga</i> Gaertn.	381
„ <i>Hoffmanni</i> M. B.	355	<i>Visnaga</i> Pers., sect.	381
„ „ Schmalh.	351	„ <i>daucoides</i> Gaertn	382
„ <i>Kitaibellii</i> Ldb.	351, 356	„ <i>vera</i> Raf.	382
„ <i>Kitaibellii</i> M. B.	357	<i>Waschingtonia</i> Rafin.	148
„ <i>leiogona</i> (C. A. M.) B. Fedtsch.	357	„ subgen. <i>Osmorrhiza</i> C. et K.	148
„ <i>Lessingii</i> Kryl.	351	„ <i>amurensis</i> K.-Pol.	149
„ „ Rehb.	356	„ <i>Claytonii</i> K.-Pol.	149
„ <i>multicaulis</i> (Poir.) Schischk.	352	<i>Wydleria</i> DC.	373
„ <i>muricata</i> Godet	356	<i>Wylia</i> Hoffm.	139, 145
„ <i>polyclada</i> Schischk.	351	„ (Hoff.) Thell., subgen.	145
„ <i>ramosissima</i> Fisch.	352	„ <i>iberica</i> Hoffm.	142
„ „ Kar. et Kir.	496	„ <i>Pecten-Veneris</i> Bubani	141
„ „ Ldb.	351	„ <i>radians</i> Hoffm.	145
„ <i>seseloides</i> Ldb.	362	<i>Yabea</i> K.-Pol.	39, 174
„ <i>Stankovii</i> Schischk.	352	„ <i>microcarpa</i> (Hook. et Arn.) K.-Pol.	39, 174
„ <i>taurica</i> Schmalh.	358	Zeravschania Korov.	412
„ <i>tuberculata</i> Turcz.	356	„ <i>Regeliana</i> Korov.	412
„ <i>ucrainica</i> Schischk.	351		
Turgenia Hoffm.	174		
„ subgen. <i>Turgeniodoxa</i> K.-Pol.	174		

VEGETATION REGIONS OF THE USSR

Abbreviated name

Full name

I. Arctic

- | | |
|----------------------|------------------------|
| 1. Arc. Eur. | Arctic (European part) |
| 2. Nov. Z. | Novaya Zemlya |
| 3. Arc. Sib. | Arctic (Siberia) |
| 4. Chuk | Chukchi |
| 5. An | Anadyr |

II. European part

- | | |
|-----------------------|-----------------|
| 6. Kar.-Lap | Karelia-Lapland |
| 7. Dv.-Pech. | Dvina-Pechora |
| 8. Balt. | Baltic States |
| 9. Lad.-Il'm. | Ladoga-Il'men |
| 10. U. V. | Upper Volga |
| 11. V.-Kama | Volga-Kama |
| 12. U. Dnp. | Upper Dnieper |
| 13. M. Dnp. | Middle Dnieper |
| 14. V.-Don. | Volga-Don |
| 15. Transv. | Transvolga area |
| 16. U. Dns. | Upper Dniester |
| 17. Bes. | Bessarabia |
| 18. Bl. | Black Sea area |
| 19. Crim. | Crimea |
| 20. L. Don | Lower Don |
| 21. L. V. | Lower Volga |

III. Caucasus

- | | |
|------------------------|------------------------|
| 22. Cisc. | Ciscaucasia |
| 23. Dag. | Dagestan |
| 24. W. Transc. | Western Transcaucasia |
| 25. E. Transc. | Eastern Transcaucasia |
| 26. S. Transc. | Southern Transcaucasia |
| 27. Tal. | Talysh |

IV. West Siberia

- | | |
|---------------------|--|
| 28. Ob | Ob region (from the eastern slopes
of the Urals to the Yenisei River) |
| 29. U. Tob. | Upper Tobol |
| 30. Irt. | Irtysk |
| 31. Alt. | Altai |

V. East Siberia	
32. Yenisei	Yenisei
33. Lena-Kol.	Lena-Kolyma
34. Ang.-Say.	Angara River-Sayans
35. Dau.	Dauria
VI. Far East	
36. Kamch.	Kamchatka
37. Okh.	Okhotsk
38. Ze.-Bu.	Zeya-Bureya
39. Uda.	Udar River area
40. Uss.	Ussuri
41. Sakh.	Sakhalin
VII. Soviet Central Asia	
42. Ar.-Casp.	Aral-Caspian
43. Balkh.	Lake Balkhash area
44. Dzu-Tarb	Dzungaria-Tarbagatai
45. Kyz. K.	Kyzyl-Kum
46. Kara K.	Kara-Kum
47. Mtn. Turkm.	Mountainous part of Turkmenistan
48. Amu D.	Amu Darya
49. Syr D.	Syr Darya
50. Pam.-Al.	Pamir-Alai
51. T. Sh.	Tien Shan
Accepted Regions for Indication of General Distribution of Species Appearing in "Flora of the U. S. S. R."	
I. Arc.	Arctic (Spitsbergen, Greenland and farther)
II. Scand.	Scandinavia (Norway, Denmark, Sweden, Finland)
III. Centr. Eur.	Central Europe (Germany, Poland, Czechoslovakia, Hungary, Austria, Switzerland)
IV. Atl. Eur.	Atlantic Europe (Netherlands, Belgium, Britain, France, Portugal)
V. Med.	Mediterranean (including North Africa)
VI. Bal.-As. Min.	Balkan Peninsula and Asia Minor
VII. Arm.-Kurd.	Lesser Armenia and Kurdistan
VIII. Iran	Iran and Afghanistan
IX. Ind.-Him.	India and Himalayas
X. Dzu.-Kash.	[Dzungaria-Kashgar area] Eastern or Chinese Turkestan (Sinkiang)
XI. Mong.	Mongolia
XII. Jap.-Ch.	Japan and China
XIII. Ber.	North American coast of the Bering Sea
XIV. N. Am.	North America (U. S. A. and Canada)
XV. Tib.	Tibet

Other Geographical Abbreviations

Afr.	Africa
Aust.	Australia
Centr.	Central
E.	East(ern)
Gr.	Great, Greater
I.	Island
Is.	Islands
Mt.	Mount
Mts.	Mountains
N.	North(ern)
R.	River
S.	South(ern)
W.	West(ern)

TRANSLATOR'S NOTE

1. The Russian term "Srednyaya Aziya" is, in English, Central Asia (or Soviet Central Asia). Therefore the term Middle Asia has been used for Russian "Tsentral'naya Aziya," which is non-Soviet inner Asia, comprising western China (Sinkiang and Tibet) and Mongolia.

2. According to Russian usage, the European part of the USSR is "eastern Europe." Therefore "western Europe" includes the whole of Europe outside the USSR.

EXPLANATORY LIST OF ABBREVIATIONS OF
RUSSIAN INSTITUTIONS AND PERIODICALS
APPEARING IN THIS TEXT

Abbreviation	Full name (transliterated)	Translation
Bot.-Geogr. issled. v Turkest	Botaniko-geograficheskie issledovaniya v Turkestane	Botanical and Geographical Investigations in Turkestan
Bot. Mat. Gerb. Bot. inst. AN SSR	Botanicheskie Materialy Gerbariya Botaniche- skogo instituta AN SSSR	Botanical Materials of the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR
Bot. Mat. Gerb. Gl. Bot. Sada	Botanicheskie Materialy Gerbariya Glavnogo Botanicheskogo Sada	Botanical Materials of the Herbarium of the Main Botanical Gardens
Bot. zap. SPb. univ.	Botanicheskii zapiski Sankt-Peterburgskogo universiteta	Botanical Notes of St. Petersburg University
Bot. zhurn. SSSR	Botanicheskii zhurnal SSSR	Botanical Journal of the USSR
Byull. Glavn. Bot. Sada	Byulleten' Glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Byull. Obshch. lyubit. estest- vozn., antrop. i etnogr.	Byulleten' Obshchestva lyubitelei estestvoznaniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Byull. Voronezh. obshch. estestv.	Byulleten' Voronezh- skogo obshchestva estestvoispytatelei	Bulletin of the Voronezh Society of Naturalists
Dendr.	Dendrarii	Arboretum
Der. i kust	Derev'ya i kustarniki	Trees and Shrubs
Der. i kust. Kavk.	Derev'ya i kustarniki Kavkaza	Trees and Shrubs of the Caucasus
Dikie polezn. i tekhnich. rasteniya SSSR	Dikie poleznye i tekhnicheskie rasteniya SSSR	Useful Wild Plants and Industrial Crops of the USSR
Dikorastushchie r. Kavkaza, ikh rasprostranenie, svoistva i primeneniye	Dikorastushchie rasteniya Kavkaza, ikh rasprostraneniye, svoistva i primeneniye	Wild Plants of the Caucasus, Their Distribution, Properties and Uses
Dokl. AN Azerb. SSR	Doklady Akademii Nauk Azerbaidzhanskoi SSR	Reports of the Academy of Sciences of the Azerbaijan SSR

Fl.	Flora	Flora
Fl. Abkh.	Flora Abkhazii	Abkhasian Flora
Fl. Almat.	Flora Alma-Atinskogo	Flora of the Alma-Ata
Zapovedn.	Zapovednika	Reserve
Fl. Alt.	Flora Altaya	Altai Flora
Fl. Alt. i Tomsk.	Flora Altaiskoi i	Flora of Altai and Tomsk
gub.	Tomskoi gubernii	Provinces
Fl. Az. Ross.	Flora Aziatskoi Rossii	Flora of Asiatic Russia
Fl. Evröp. Rossii	Flora Evropeiskoi Rossii	Flora of European Russia
Fl. Gruzii	Flora Gruzii	Georgian Flora
Fl. Kamch.	Flora Kamchatki	Kamchatkan Flora
Fl. Kavk.	Flora Kavkaza	Caucasian Flora
Fl. Man'chzh.	Flora Man'chzhurii	Manchurian Flora
Fl. Mosk. gub.	Flora Moskovskoi	Flora of Moscow Province
	gubernii	
Fl. Poles'ya	Flora Poles'ya	Flora of Polesie
Fl. Sev. Kraya	Flora Severnogo Kraya	Flora of the Northern
		Territory
Fl. Sakh.	Flora Sakhalina	Flora of Sakhalin
Fl. Sib.	Flora Sibiri	Siberian Flora
Fl. Sib. i Dal'n.	Flora Sibiri i Dal'nego	Flora of Siberia and the
Vost.	Vostoka	Far East
Fl. Sr. i Yuzhn.	Flora Srednei i Yuzhnoi	Flora of Central and
Ross.	Rossii	Southern Russia
Fl. Sr. Ross.	Flora Srednei Rossii	Flora of Central Russia
Fl. Tadzhik.	Flora Tadzhikistana	Flora of Tadzhikistan
Fl. Talysh.	Flora Talysha	Talysh Flora
Fl. Tsentr.	Flora Tsentral'nogo	Flora of Central Kazakh-
Kazakhst.	Kazakhstana	stan
Fl. Vost. Evr.	Flora Vostochnoi	Flora of East European
Ross.	Evropeiskoi Rossii	Russia
Fl. Yugo-Vost.	Flora Yugo-Vostoka	Flora of Southeast
Fl. Yugo-zap.	Flora Yugo-zapadnoi	Flora of Southwest Russia
Ross.	Rossii	
Fl. Yur. Bot.	Flora Yur'evskogo	Flora of Yur'ev Botanical
sada	botanicheskogo sada	Garden
Fl. Zap. Sib.	Flora Zapadnoi Sibiri	Flora of West Siberia
Gerb. donsk. fl.	Gerbarii donskoi flory	Herbarium of Don Flora
Gerb. Orlovsk.	Gerbarii Orlovskoi	Herbarium of Orel Province
gub.	gubernii	
Gerb. Ukr. fl.	Gerbarii Ukrainskoi flory	Herbarium of Ukrainian Flora
GRF	Gerbarii Russkoi Flory	Herbarium of Russian Flora
Ill. Fl. Mosk. gub.	Illyustrirovannaya Flora	Illustrated Flora of Moscow
	Moskovskoi gubernii	Province
Izv. AN SSSR	Izvestiya AN SSSR	Bulletin of the Academy of
		Sciences of the USSR
Izv. Bot. Sada	Izvestiya Botanicheskogo	Bulletin of the Botanical
	Sada	Gardens
Izv. Bot. Sada	Izvestiya Botanicheskogo	Bulletin of Peter the Great
Petra Vel.	Sada Petra Velikogo	Botanical Gardens

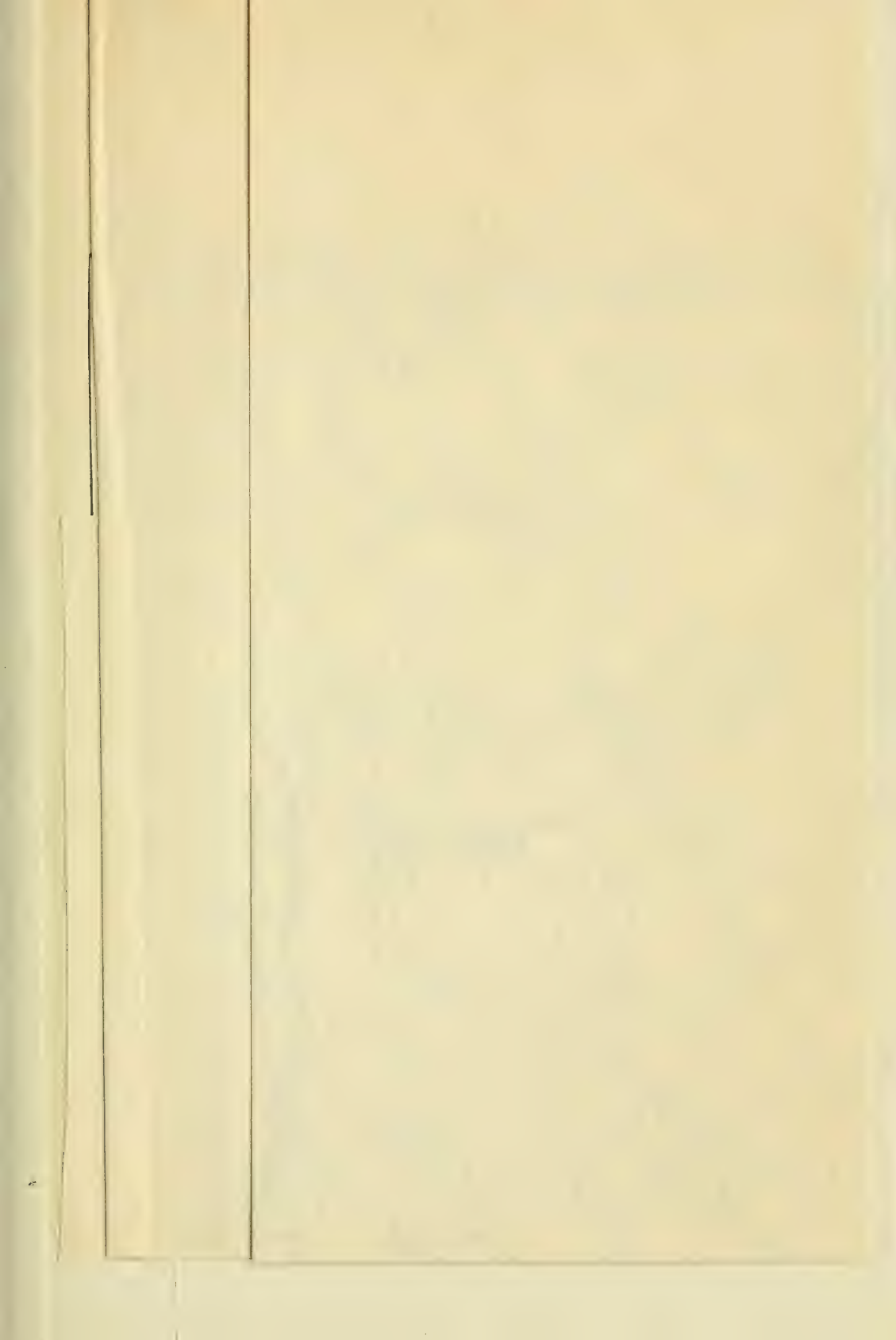
Izv. Gl. Bot. Sada	Izvestiya Glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Izv. Kavk. Muzeiya	Izvestiya Kavkazskogo Muzeiya	Bulletin of the Caucasian Museum
Izv. Kazakhst. fil. AN SSSR	Izvestiya Kazakhstanskogo Filiala Akademii Nauk SSSR	Bulletin of the Kazakhstan Branch of the Academy of Sciences of the USSR
Izv. Kievsk. Bot. Sada	Izvestiya Kievskogo Botanicheskogo Sada	Bulletin of the Kiev Botanical Gardens
Izv. Obshch. lyubit. estestvozn., antrop. i etnogr.	Izvestiya Obshchestva lyubitelei estestvoznaniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Izv. Obshch. Sadov.	Izvestiya Obshchestva Sadovodov	Bulletin of the Horticulturists' Society
Izv. Tadzhik. Bazy AN SSSR	Izvestiya Tadzhikskoi Bazy Akademii Nauk SSSR	Bulletin of the Tadzhikistan Base of the Academy of Sciences of the USSR
Konsp. rast. okr. Khar'kova	Konspekt rastenii okrug Khar'kova	Compendium of Plants of Kharkov District
Korm. rast. Estestv. senokosov i pastb. SSSR	Kormovye rasteniya estestvennykh senokosov i pastbishch SSSR	Fodder Plants of Natural Hay Meadows and Pastures of the USSR
Mat. (dlya) Fl. Kavk.	Materialy dlya Flory Kavkaza	Material on Caucasian Flora
Mat. (dlya) fl. Sredn. Azii	Materialy dlya flory Srednei Azii	Materials on Soviet Central Asian Flora
Mat. (dlya) Fl. stepei Kher'sonsk. Gub.	Materialy dlya Flory stepei Khersonskoi Gubernii	Materials on the Flora of Kherson Province Steppes
Nov. obozr.	Novoe obozrenie	New Review
Ob. rast. Kievsk. uch. okr.	Obzor rastitel'nosti Kievskogo uchebnogo okrug	Survey of Vegetation in the Kiev Educational District
Obz. Krym.-Kavk. Medicago	Obzor Krymsko-Kavkazskogo Medicago	Survey of Crimean-Caucasian Medicago
Och. obozr. i fl. Karpat	Ocherki rastitel'nosti i flory Karpat	Survey of Carpathian Vegetation and Flora
Ocherk. Tifl. fl.	Ocherki Tiflisskoi flory	Survey of Tiflis [Tbilisi] Flora
Opis. Amur. obl.	Opisanie Amurskoi oblasti	Description of the Amur Region
Opis. ist. razv. fl. vost. Tyan'-Shanya	Opisanie istorii razvitiya flory vostochnogo Tyan'-Shanya	Description of the History of the Development of Flora of the Eastern Tien Shan
Opis. nov. rast. Turk.	Opisanie novykh rastenii Turkestana	Description of New Plants of Turkestan
Opis. nov. vidov	Opisanie novykh vidov	Description of New Species
Opred. der. i kust.	Opredelitel' derev'ev i kustarnikov	Key to Trees and Shrubs

Opred. rast. Dal'nevost. kr.	Opredelitel' rastenii Dal'nevostochnogo kraya	Key to Plants of the Far Eastern Territory
Opred. rast. Kavk.	Opredelitel' rastenii Kavkaza	Key to Caucasian Plants
Opred. vyssh.	Opredelitel' vysshikh rastenii	Key to Higher Plants
Opred. (vyssh.) rasten. Evrop. chasti SSSR	Opredelitel' (vysshikh) rastenii Evropeiskoi chasti SSSR	Key to Higher Plants of the European USSR
Opyt Russko- Kavk. Fl.	Opyt Russko-Kavkazskoi Flory	Attempted Russian- Caucasian Flora
Perech. rast. Turk.	Perechen' rastenii Turkmenii	List of Turkmenian Plants
Pochv. eksped. v bass. r. Syr- Dar'i i Amu- Dar'i	Pochvennaya ekspeditsiya v basseiny rek Syr- Dar'i i Amu-Dar'i	Soil Science Expedition to the Syr-Darya and Amu- Darya River Basins
Priroda	Priroda	Nature
Protok. Zased. Kievsk. Obshch. Estestv.	Protokol Zasedaniya Kievskogo Obshchest- va Estestvoispytatelei	Protocol of a Conference of Kiev Naturalists' Society
Putesh.	Puteshestviya	Travels
Rast. i fl. Karp.	Rasteniya i flora Karpat	Plants and Flora of the Carpathians
Rast. letn. pastb. Gandzh.	Rasteniya letnikh past- bishch Gandzhi	Vegetation of Gandzha [now Kirovabad] Summer Pastures
Rast. res. Turkm.	Rastitel'nye resursy Turkmenii	Plant Resources of Turk- menia
Rast. resursy Kavkaza	Rastitel'nye resursy Kavkaza	Plant Resources of the Caucasus
Rast. sib.	Rastitel'nost' Sibiri	Vegetation of Siberia
Rast. Sr. Az.	Rastitel'nost' Srednei Azii	Vegetation of Soviet Central Asia
Rast. Turkest.	Rastitel'nost' Turke- stana	Vegetation of Turkestan
Rast. Zakasp. obl.	Rastitel'nost' Zakaspii- skoi oblasti	Vegetation of the Trans- caspian Region
Rastit. Kavk.	Rastitel'nost' Kavkaza	Vegetation of the Caucasus
Rastit. pokrov. vost. Pamira	Rastitel'nyi pokrov vostochnogo Pamira	Plant Cover of the Eastern Pamirs
Rastit. syr'e Kazakhst.	Rastitel'noe syr'e Kazakhstana	Plant Resources of Kazakhstan
Rastit. zapovedn. Guralash i Zaaminsk. lesn. ugodii	Rastitel'nost' zapoved- nika Guralash i Zaaminskikh les- nykh ugodii	Vegetation of Guralash Reserve and Zaamin Forest Forest Lands
Rezult' dvukh puteshestv. na Kavk.	Rezultaty dvukh putesh- stvii na Kavkaz	Results of Two Travels to the Caucasus

Russk. Fl.	Russkaya Flora	Russian Flora
Russk. lek. rast.	Russkie lekarstvennye rasteniya	Russian Medicinal Plants
Sbor, sushka i raz. lek. rast.	Sbor, sushka i razvitie lekarstvennykh rastenii	Gathering, Drying and Development of Medicinal Plants
Sborn. rast. SSSR	Sornye rasteniya SSSR	Weed Plants of the USSR
Sots. Rastenievodstvo	Sotsialisticheskoe Rastenievodstvo	Socialist Plant Growing
Sov. Bot.	Sovetskaya Botanika	Soviet Botany
Sov. Farmats.	Sovetskaya Farmatsevtika	Soviet Pharmaceutics
Spis. rast.	Spisok rastenii	List of Plants
Spis. Rast. Krymsk. Zapovedn.	Spisok Rastenii Krymskogo Zapovednika	List of Plants of the Crimean Reserve
Tr. Bot. inst. AN SSSR	Trudy Botanicheskogo instituta AN SSSR	Transactions of the Botanical Institute of the Academy of Sciences of the USSR
Tr. Bot. Inst. Azerb. Filiala Akad. Nauk	Trudy Botanicheskogo Instituta Azerbaidzhanskogo Filiala Akademii Nauk	Transactions of the Botanical Institute of Azerbaijan Branch of the Academy of Sciences
Tr. Bot. Sada	Trudy Botanicheskogo Sada	Transactions of the Botanical Gardens
Tr. Bot. Sada Yur'evsk. Univ.	Trudy Botanicheskogo Sada Yur'evskogo Universiteta	Transactions of the Botanical Gardens of Yur'ev [now Tartu] University
Tr. Byuro prikl. Bot.	Trudy Byuro po prikladnoi botanike	Transactions of the Bureau of Applied Botany
Tr. Dal'nevost. bazy AN SSSR	Trudy Dal'nevostochnoi bazy AN SSSR	Transactions of the Academy of Sciences of the USSR
Tr. Inst. nov. lub. syr'ya	Trudy Instituta novogo lubyanogo syr'ya	Transactions of the Institute of New Fiber Raw Materials
Tr. Nauk.-Doslid. Inst. Bot. Khar. Derzh. Univ.	Trudy naukovykh doslidnoho instytutu botaniky Kharkivs'koho Derzhavnoho Universytetu	Transactions of the Botanical Research Institute of the Kharkov State University
Tr. Obshch. isp. prir. Khark'k. univ.	Trudy Obshchestva ispytatelei prirody Khar'kovskogo universiteta	Transactions of the Naturalists' Society of Kharkov University
Tr. Obshch. sadov. v Odesse	Trudy Obshchestva sadovodov v Odesse	Transactions of the Odessa Horticulturists' Society
Tr. odesk. obsh. sadov.	Trudy odeskogo obshchestva sadovodov	Transactions of Odessa Horticulturists' Society
Tr. Peterb. obshch. estestvoisp.	Trudy Peterburgskogo obshchestva estestvoispytatelei	Transactions of St. Petersburg Naturalists' Society

Tr. pochv.-bot. eksp. Peresl. upr.	Trudy pochvennobota- nicheskoi ekspeditsii Pereslavskogo upravleniya	Transactions of the Soil- Botanical Expedition of Pereslavl Administration
Tr. po geobot. obsled. pastb. Azerb.	Trudy po geobotaniche- skim obsledovaniyam pastbishch Azerbaidzhana	Transactions of Geobotanical Investigations of Azerbaijan Pastures
Tr. Odessk. otd. R. obshch. sadov	Trudy Odesskogo otdel'- niya Rossiiskogo ob- shchestva sadovodov	Transactions of Odessa Branch of the Russian Horticulturists' Society
Tr. prikl. bot. (gen. i sel.)	Trudy po prikladnoi botanike, genetike i selektсии	Transactions of Applied Botany, Genetics and Selection
Tr. Ross. Obshch. sadov.	Trudy Rossiiskogo ob- shchestva sadovodov	Transactions of the Russian Horticulturists' Society
Tr. SAGU	Trudy Sredneaziatskogo Gosudarstvennogo Universiteta	Transactions of the Soviet Central Asian State University
Tr. Sarat. obshch. estestvoisp.	Trudy Saratovskogo obshchestva estest- voispytatelei	Transactions of the Saratov Naturalists' Society
Tr. Sil'skogospod. komit. bot.	Trudy sil'skohospodar'- skoho komiteta botaniky	Transactions of the Botanical Agricultural Committee
Tr. SPb. obshch. estestv.	Trudy Sankt-Peterburg- skogo obshchestva	Transactions of the St. Peters- burg Naturalists' Society
Tr. Tadzh. bazy AN SSSR	Trudy Tadzhikskoi bazy AN SSSR	Transactions of the Tadzhik- istan Base of the Academy of Sciences of the USSR
Tr. Tbil. bot. inst.	Trudy Tbilisskogo bota- nicheskogo instituta	Transactions of Tbilisi Botanical Institute
Tr. Tbil. (or Tifl.) bot. sada	Trudy Tbilisskogo (Tiflisskogo) botaniche- skogo sada	Transactions of the Tbilisi (Tiflis) Botanical Garden
Tr. Turkmensk. bot. sada	Trudy Turkmenskogo botanicheskogo sada	Transactions of the Turk- menian Botanical Garden
Tr. Turk. nauchn. obshch.	Trudy Turkmenskogo nauchnogo obshchestva	Transactions of the Turk- menian Scientific Society
Uchen. Zapiski Kazansk. Gos. Univ.	Uchenye Zapiski Kazan- skogo Gosudarstven- nogo Universiteta	Scientific Reports of the Kazan State University
Vest. Akad. Nauk. (or AN) Kazakhsk. SSR	Vestnik Akademii Nauk Kazakhskoi SSR	Bulletin of the Academy of Sciences of the Kazakh SSR
Vestn. estestv. nauk	Vestnik estestven- nykh nauk	Bulletin of Natural Sciences
Vestn. Ross. Obshch. sadov	Vestnik Rossiiskogo Obshchestva sadovodov	Bulletin of the Russian Horticulturists' Society
Vest. Tifl. bot. sada	Vestnik Tiflisskogo botanicheskogo sada	Bulletin of Tiflis Botanical Garden

Visn. Kyivsk. bot. sadu	Visnyk Kyivsk'koho botanichnoho sadu	Bulletin of the Kiev Botanical Garden
Vizn. (or Vznachn.) rosl. URSR	Viznachnyk rosl. URSR	Key to Plants of the Ukrainian SSR
V obl. polupustyni Yadov. rast.	V oblasti polupustyni Yadovitye rasteniya	(In the) Semidesert Region Poisonous Plants of Meadows and Pastures
lugov i pastb. Yubil. sbornik V. L. Komar- ovu	lugov i pastbishch Yubileinyi Sbornik Posvyashchennyi V. L. Komarovu	Jubilee Collection Dedicated to V. L. Komarov
Zam. po sist. i geogr. rast. Tbil. bot. inst.	Zametki po sistematike i geografii rastenii Tbilisskogo botaniche- skogo instituta	Notes on Taxonomy and Geography of Plants of the Tbilisi Botanical Institute
Zam. o Rast. Russk. Flory	Zametki o Rastenyakh Russkoi Flory	Notes on Plants of the Russian Flora
Zam. po fl. EL'T	Zametki po flore El'tona	Notes on the Flora of Elton
Zap. Kievsk. Obshch.	Zapiski Kievskogo Obshchestva Estest- voispytatelei	Reports of the Kiev Society of Naturalists
Zap. Kyivsk. Inst. Nar. Osv.	Zapysky Kyivsk'koho Instytutu Narodnoho Osvichennya	Reports of the Kiev Institute of Public Education
Zap. Nauchno- Prikl. Otd.	Zapiski Nauchno-Prik- ladnogo Otdeleniya Tiflisskogo Sada	Reports of the Applied Sciences Section of the Tiflis [Tbilisi] Botanical Garden
Zap. NOVO-ROSS. obshch. Estestv.	Zapiski Novorossiiskogo obshchestva Estest- voispytatelei	Reports of the Novorossiisk Society of Naturalists.
Zap. Russk. geogr. obshch.	Zapiski Russkogo geo- graficheskogo obshchestva	Reports of the Russian Geographical Society
Zhurn. Bot. obshch.	Zhurnal Botanicheskogo obshchestva	Journal of the Botanical Society
Zhurn. opytn. agron. Yugo- Vost.	Zhurnal opytnoi agro- nomii Yugo-Vostoka	Journal of Experimental Agronomy of the Southeast



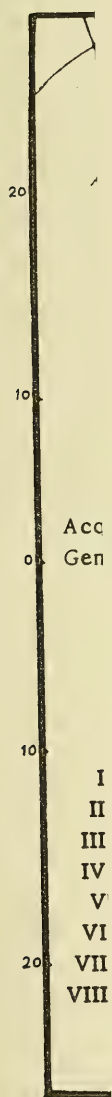
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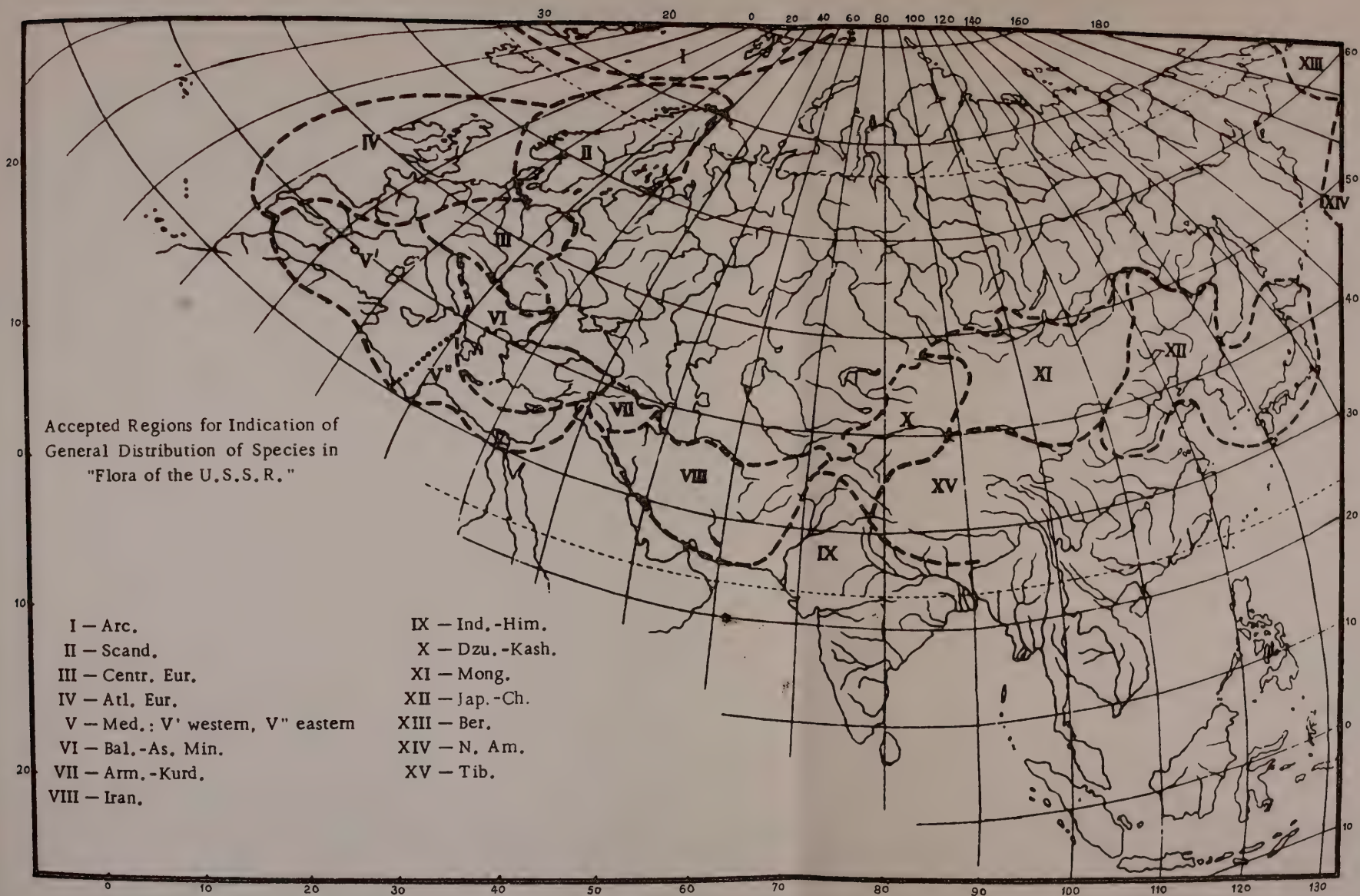
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Volume XVII

B.K. Shishkin, Editor

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(continued)

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(Series initiated by V.I. Komarov)

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Chief Editor B.K. Shishkin
Volume Editor B.K. Shishkin

Compiled by
E.P. Korovin, K.M. Koroleva,
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Genera: Ferula, Oedibasis, Korovina	Arranged by E.P. Korovin
Genus Dorema	Arranged by K.M. Koroleva
Genera: Symphyoloma, Heracleum, Stenotaenia	Arranged by I.P. Mandenova
Family Cornaceae	Arranged by A.I. Poyarkova
Reports on findings of fossils of plants	Arranged by A.N. Krishtofovich
Addenda — Descriptiones plantarum novarum in tomo XVII Florae URSS commemoratarum.	

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PREFACE

Volume XVII concludes the description of all apetalous and choripetalous orders of the dicotyledonous flora of the Soviet Union. It also marks the conclusion of the second and largest stage in the preparation of "Flora of the USSR" by Soviet taxonomists. Volumes V to XVII dealt with 83 families comprising 733 genera with 7,080 species. Apart from this the most widespread cultivars were studied and classified. The present volume also includes a special section devoted to the families described in volumes V to XVII.

Volume XVII deals with the remainder of the Umbelliferae and Cornaceae. The largest genus of Umbelliferae in terms of species described in this book is *Ferula*, which includes landscape plants of Central Asia. Many of its species yield valuable resins for technological and medicinal uses. In 1947 a monograph of *Ferula* was published by E. P. Korovin. The treatment of the difficult genus *Heraclium*, which is very variable in the Caucasus, is by I. P. Mandenova, who published a monograph on the Caucasian species of this genus in 1950. B. K. Shishkin is responsible for the descriptions of many genera of Umbelliferae. The treatment of Cornaceae is by A. I. Poyarkova.

The Editors

- 1 Tribe 7. PEUCEDANEAE DC. Prodr. IV (1830) 57, 170.— Flowers bisexual or polygamous. Calyx-teeth inconspicuous. Petals oval or obcordate with inward curved tip; stylopodium usually prominent; fruit markedly compressed dorsally; all or only the 2 marginal ribs winged, these usually much wider than the dorsal.

Genus 1037. **CONIOSELINUM*** Fisch.

ex Hoffm. Gen. Umb. ed. 1 (1814) 180 and XXVIII; ed. 2 (1816) 185.— Vvedenskia Korov. in Bot. mat. gerb. Inst. bot. i zool. AN UzSSR, VIII (1947) 10

Calyx-teeth inconspicuous; petals white, broadly obovate, notched, with inward curved tip; stylopodium short-conical; styles reflexed, longer than stylopodium; fruit ovoid-oblong, strongly flattened dorsally; mericarps with the 3 dorsal wings much narrower than the marginal; primary ribs without distinct fascicles; 1–4 canals under valleculae, 4–8 toward commissure; albumen flat toward commissure. Perennial glabrous herbs, with 2–3 pinnate leaves.

Up to 12 species in the mountains of Central Asia, throughout Siberia to the Pacific Ocean, in North America, North and Central Europe.

1. Leaves simple pinnate, with 2–5 pairs of ovate, dentate or incised leaflets (Okh.) 2.
- + Leaves 2–3-pinnate 3.
2. Involucels absent (Centr. Asia) 8. *C. pinnatifolium* (Korov.) Schischk.
- + Involucels of 5–7 lanceolate leaflets (Okh.) . . . 7. *C. victoris* Schischk.
3. Terminal leaf lobes linear, 2–5 cm long, 1–3 cm wide, entire 4.
- + Terminal leaf lobes ovate or lanceolate, 0.5–2 mm wide, dentate or pinnate-incised 5.
- 2 4. Umbels of 10–15 rays, acutely scabrous above; leaflets of involucels linear with narrow scarious margin (E. Siberia) 5. *C. longifolium* Turcz.
- + Umbels of 7–10 rays, glabrous or obscurely scabrous above; leaflets of involucels filiform or narrowly linear, usually without scarious margin (N. European part) 6. *C. boreale* Schischk.
5. Nearly all leaves radical; stem 10–40 cm high with 1 leaf or leafless (W. Pamir) 4. *C. schugnanicum* B. Fedtsh.
- + Stem higher, 50–150 cm high, leafy 6.

* The name is composed of two generic names: *conium* (see Volume XVI, page 225) and *selinum* (see page 560).

6. Fruit 6.5–8.5 mm long, 4–5 mm wide; leaflets of involucels usually longer than umbellets (Far East). 3. *C. kamtschaticum* Rupr.
 + Fruit 3.5–6 mm long, 2.5–4 mm wide; leaflets of involucels as long as or shorter than umbellets 7.
 7. Mericarps with 4–8 canals toward commissure.
 1. *C. vaginatum* (Spreng.) Thell.
 + Mericarps with 2, often obsolete canals toward commissure (Mtn. Central Asia) 2. *C. latifolium* Rupr.

Series 1. *Vaginata* Schischk. — Terminal leaf lobes ovate or lanceolate, dentate.

1. *C. vaginatum* (Spreng.) Thell. in Hegi, *Illustr. Fl. Mitt.-Europa*, V, 2 (1926) 1329; Kryl., *Fl. Zap. Sib.* VIII, 2061. — *C. tataricum* Fisch. ex Hoffm. *Gen. Umbell.* ed. 2 (1816) 185. — *C. ingricum* Fisch. *Ind. sem. Hort. Petrop.* (1824) 22, nom. — *C. Fischeri* Wimm. et Grab. *Fl. Siles.* 1 (1827) 266; DC. *Prodr.* IV, 164; Ldb. *Fl. Ross.* II, 290. — *C. neglectum* Fisch. ex Steud. *Nomencl.* ed. 2, I (1840) 403, 404. — *C. Gmelini* Steud. *I. c.* (1840) 403, non Coult. et Rose (1900). — *C. univittatum* Turcz. ex Kar. et Kir. in *Bull. Soc. Nat. Mosc.* XV (1842) 363. — *C. altaicum* Rupr. in *Beitr. Pfl. Russ. Reich.* XI (1859) 22. — *Ligusticum vaginatum* Spreng. *Pugill.* (1815) 57. — *L. Fischeri* D. Dietr. *Syn. Pl.* II (1839–1852) 960; Shmal'g., *Fl. I*, 402. — *Angelica chaerophyllea* Lottermoser in Eysenh. *Diss. inaug. De accur. pl. compar.* (1823) 12. — *Selinum Gmelini* Bray in *Denkschr. Bayer. Bot. Ges. Regensb.* II (1818) 36; Ldb. *Fl. alt.* 1, 318. — *Ic.*; Rchb. *Ic. Fl. Germ.* XXI, tab. 1919; Syreishch., *Ill. Fl. Moskov. gub.* II, 410.

- 3 Perennial; entire plant glabrous; stem 50–150 cm high, cylindrical, slightly furrowed, slightly geniculately curved at nodes, branching in upper part, covered with glaucous bloom; lower leaves 15–30 cm long and as wide, petioled, broadly triangular, 2–3-pinnate, green, shiny above, paler beneath, two lower lobes of the first order ovate or oblong, their petioles much larger than the rest; lower lobes of second order short-petioluled, ovate-oblong, pinnately divided into 1.4 cm long, 0.3–2 cm wide, ovate-lanceolate or oblong, pinnately incised or large-toothed lobes of last order, with faintly involute slightly crenate-scabrous margin; petioles gradually expanded to long amplexicaul sheath; upper leaves smaller, sessile on broad inflated sheaths diverging from stem. Umbels 6–10 cm across, of 15–30 long, nearly equal rays scabrous above; involucre of 1–3 deciduous leaflets or absent; umbellets many-flowered, 1.2–2 cm across, with rather long scabrous pedicels; leaflets of involucels many, linear-filiform, with scabrous margin, longer than pedicels; calyx-teeth inconspicuous; petals white, obcordate, with blunt or acute inward curved tip, peripheral slightly larger than others; fruit glabrous, shiny, ovoid-oblong, 4–5 mm long, ca. 3 mm wide, canals 1–3 per vallecule, (4) 6–8 toward commissure; stylopodium short-conical. July–August. (Plate VIII, Figure 2.)

Coniferous, mixed and birch-aspen forests, forest edges, shrubby formations, damp meadows. — European part: Kar. -Lap., Dv. -Pech., Lad. -Ilm., Balt., U. V., V. -Kama, U. Dnp., M. D., V. -Don; W. Siberia: everywhere; E. Siberia: everywhere; Centr. Asia: Dzu-Tarb. Gen. distr.: Centr. Eur. Described from Siberia. Type in Berlin.

2. *C. latifolium* Rupr. in Osten-Sack. et Rupr. Sertum tiansch. (1860) 48. — *C. schugnanicum* B. Fedtsch. in Tr. Bot. muz. Akad. Nauk. 1 (1902) 135, p. p. — *C. alaicum* Lipsky in Sched. Herb. Leninopol.

Perennial; stem 50–150 cm high, rounded, shiny, branching above, like leaves glabrous; leaves 30 cm long, 25 cm wide, broadly triangular, 3-, sometimes nearly 4-pinnatisect, petioled, dilated into cylindrical sheath, primary and secondary lobes short-petioled, lobes of third order pinnatisect nearly to base into lanceolate-linear acute lobules 0.5–1 cm long, 1–1.5 mm wide; upper leaves smaller, almost reduced to clasping or slightly divergent sheath. Umbels 1.5–5 cm across, of 9–15 smooth rays; involucre absent or of 1–3 caducous leaflets of unequal length; umbellets ca. 1 cm across; involucels of 5–7 linear leaflets as long as umbellets or shorter; petals white (greenish-reddish when young); fruit broadly ovoid, 5–7 mm long, 4 mm wide, with 3 narrowly winged dorsal and winged lateral ribs, wings ca. 1 mm wide; stylopodium flattened, short-conical; styles reflexed, longer than stylopodium. July. (Plate VIII, Figure 3.)

Along edges of mountain forests, in Central Asian juniper woodland. — Centr. Asia: T. Sh., Pam. -Al. Endemic. Described from Tien Shan. Type in Leningrad.

3. *C. kamtschaticum* Rupr. Beitr. Pfl. Russ. Reich. XI (1859) 22; Kom., Fl. Kamch. II, 343. — *Ligusticum* Gmelini Cham. et Schlecht. in Linnaea I (1826) 391, non *Conioselinum* Gmelini Steud. — Ic.: Miyabe et Miyake, Fl. Saghalin, tab. 7 (1919).

Perennial; root sturdy, 2–3 cm across (4–5 cm in large specimens); stems 50–150 cm high, single or few, slightly curved at nodes, glabrous like leaves, hollow inside, branching above; leaves triangular, their long petioles sheathing at base, sheath not expanding, blade 20 cm long and nearly as wide, 2-pinnate, with 5–6 primary lobes; lower leaves with more or less long petioles, upper sessile, green above, paler beneath, secondary lobes sessile or lower on short petiolules, deeply pinnatifid or deeply dentate; upper leaves smaller, not as dissected, sessile on oblong sheath. Umbels 4–9 cm across, of 15–30 faintly scabrous rays; involucre absent or of 1–3 caducous leaflets; umbellets 1.5 cm across, multiflowered, their rays obscurely scabrous above; involucels of 7–13 linear or linear-filiform, acuminate leaflets with narrow scarious margin, usually slightly longer than umbellet; stylopodium short-conical; styles $1\frac{1}{2}$ times as long as stylopodium, reflexed; fruit ovoid, 4–8.5 mm long, 2–5 mm wide, dorsal ribs narrowly winged, marginal with ca. 1 mm wide wings. July–August. (Plate VIII, Figure 1.)

Herbaceous slopes and sandy coasts. — Far East: Kamch., Sakh. Gen. dist.: Bering. Described from Kamchatka. Type in Leningrad.

Note. The widely distributed North American plant was recently classed by American authors with the Kamchatka plant under the Linnaean

epithet *C. chinense* (L.) B. S. P. (cfr. North American Flora, 28 B, p. 2 (1945) 191). This was described after specimens grown from seeds collected in Virginia but also recorded as Chinese through some misunderstanding. Our plant differs from the American one by its larger fruits and larger dimensions of all its other parts.

4. *C. schugnanicum* B. Fedtsch. in Tr. Bot. Muz. AN, I (1902) 135. — *C. papyraceum* auct. nonnul. Fl. Asiae Mediae, non Clarcke.

Perennial; root long, vertical or ascending, 4–8 mm across; stems few or single, 10–35 cm high, slightly ascending at base, simple or few-branched, glabrous like leaves, angular, not deeply ribbed, hollow inside; radical leaves numerous, 1–1.5 cm long, 2–4 cm wide, ovate-oblong, green above, paler beneath, bi- or tripinnatisect, their petioles sheathing at base; lower primary lobes on petiolules, upper sessile, ovate, pinnatifid into ovate, unequally dentate or dentate-incised lobules of the last order; cauline leaves 1, rarely 2(3), smaller, sessile on oblong sheath; terminal leaves with small undeveloped blade, often reduced to sheath. Umbels 1.5–2.5 cm across, of 4–10 obscurely scabrous, nearly equal rays; involucre of 3–7 lanceolate leaflets with scarious margins, much shorter than umbel rays, rarely involucre wanting; umbellets 5–7 mm across, few-flowered, with glabrous pedicels; involuclers of 5–7 linear acuminate leaflets, as long as, shorter or longer than umbel rays; calyx-teeth inconspicuous; petals whitish-greenish, ca. 1 mm long, ovate, notched, with inward curved lobule; stylopodium flat-conical; styles divergent; ripe fruit unknown. July–August.

Stones in alpine belt, 3,350–4,100 m. — Centr. Asia: Pam. -Al. (W. Pamir). Endemic. Described from Shugnan. Type in Leningrad.

Series 2. *Longifolia* Schischk. — Terminal leaf lobes linear, 2–5 cm long, 1–3 mm wide, entire.

5. *C. longifolium* Turcz. in Bull. Soc. Nat. Mosc. (1838) 93 nom. nud.; XVII (1844) 736 (descriptio); Ldb. Fl. Ross. II, 292. — *C. cenolophioides* Turcz. op. cit. XVII (1844) 736; Ldb. Fl. Ross. II, 291.

Biennial or perennial; entire plant glabrous; stem 25–70 cm high, cylindrical, slightly furrowed, simple or branching nearly from middle; leaves triangular, petioles of radical leaves exceeding 6–12 cm long, 5–10 cm wide blade, bi- or tripinnatisect into linear 2–5 cm long, 1–3 mm wide terminal lobes; sheaths of lower leaves short; upper leaves smaller, sessile on expanded sheath. Umbels 3–7 cm across, 7–15 rays acutely scabrous along upper edge; involucre of 1–5 lanceolate-linear recurved leaflets with scarious margins or involucre absent; umbellets ca. 1 cm across; involuclers of 5–9 linear leaflets with scarious margins, as long as, shorter or longer than umbellet; calyx-teeth inconspicuous; petals white or pink, ca. 1.5 mm long, shallowly notched, with inward curved tip, attenuate at base; fruit ovoid, 4 mm long, 2.5 mm wide, with narrowly winged dorsal ribs and winged lateral ribs with 0.75 mm wide wings. July. (Plate I, Figure 2.)

Shrubby formations, forests, meadows and gravel along river banks, extending to the subalpine belt. — E. Siberia: Ang. -Say., Dau., Lena-Kol. Endemic. Described from Malyi Irkut River. Type in Leningrad.

6. *C. boreale* Schischk. sp. nov. in Addenda XVI, 351.

Perennial; root to 1 cm thick, erect or ascending, its neck covered with dark brown fibrous remnants of leaves, entire plant glabrous, sometimes violet; stem 30–60 cm high, simple or slightly branching, thinly furrowed; leaves broadly triangular, radical and lower cauline leaves with 7–13 cm long petioles abruptly expanded to sheathing base, their blade broadly triangular, ca. 10 cm long and as wide; lobes of last order linear, 0.5–2 cm long, 1–2 mm wide; median stem leaves smaller, upper divergent, sessile on expanded sheath. Umbels 3–4 cm across, of 7–10 nearly equal rays slightly scabrous above edge; involucre absent or of 1 linear caducous leaflet; umbellets ca. 1 cm across; involucels of 5–7 narrowly linear, sometimes filiform leaflets nearly as long as umbellet; calyx-teeth inconspicuous; petals white, peripheral slightly enlarged, to 2 mm long, notched with inward curved lobule; fruit oblong, 5–6 mm long, 2.5–3 mm wide, with narrowly winged dorsal ribs and winged lateral ribs with 0.75–1 mm wide wings; stylopodium nearly flat; styles short, erect at first, growing to 1–1.5 mm long, reflexed. July–August.

Stony, muddy and pebbly seashores and river banks, clayey-sandy turfey slopes. — Arctic: Arc. Eur.; European part: Kar. -Lap. (N.), Dv. -Pech. Endemic. Described from Karelia, Yaroslavov Island in Chupa Bay. Type in Leningrad.

Series 3. *Pinnatifolia* Schischk. — Leaves simple-pinnate, with 2–5 pairs of ovate leaflets.

7. *C. victoris* Schischk. sp. nov. in Addenda XVI, 351.

Perennial; root 5–7 mm thick, vertical or ascending; stems 15–40 cm high, single, rarely 2, usually simple glabrous like leaves; radical leaves numerous, simple-pinnate, oblong, their petioles 2–3 times as long as blade, abruptly expanded to sheath; blade with 2–3 pairs of ovate or broadly ovate, 2–3 cm long, 1–2 cm wide unequally toothed leaflets, dark green above, paler beneath; terminal leaflet, sometimes also lateral trifold or tripartite; cauline leaf 1 (sometimes stem leafless), similar to radical, but smaller. Umbels 2–5 cm across, of 7–15 equal rays acutely scabrous above; involucre absent; umbellets ca. 1.5 cm across with finely scabrous rays; involucels of 5–7 lanceolate or narrow linear acuminate leaflets with scarious ciliate margins, nearly as long as umbellets, often violet; fruit nearly ovoid, slightly compressed dorsally, with 3 dorsal ribs and wider lateral ones; stylopodium short-conical; styles reflexed, longer than stylopodium. July–August. (Plate VIII, Figure 4.)

Broadleaved forests, edges of streams and marshes. — Far East: Okh. Endemic. Described from the Tauya River valley. Type in Leningrad.

8. *C. pinnatifolium* (Korov.) Schischk. comb. nov. — *Vvedenskia pinnatifolia* Korov. in Bot. mat. gerb. Inst. bot. i zool. AN UzSSR, VIII (1947) 14.

Perennial; rhizome vertical or ascending, 0.5–0.8 mm thick; stems 20–40 cm high, few, erect, hollow, thinly furrowed, simple or with few branches above; long petioles of radical leaves pass abruptly into an oblong, amplexicaul,

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PLATE I. 1 — *Mogoltavia severzovii* (Rgl.) Korov.; 2 — *Conioselinum longifolium* Turcz.

violet sheath, their blades 6–8 cm long, ca. 2 cm wide, pinnatisect into 4 pairs of oblong or oblong-ovate primary lobes; lower lobes short-petioled, upper sessile, more or less deeply pinnatifid into oblong rounded lobules; cauline leaves similar to radical, upper leaves smaller, sessile on broadened sheath. Umbels of 6–8 nearly 10 mm long rays; involucre absent; umbellets 15-flowered, without involuclers; calyx-teeth inconspicuous; petals 1.8 mm long, white, unequal, oblong-elliptic or lanceolate, with acute inward curved apex; stylopodium short-conical; styles reflexed, longer than stylopodium; fruit (young) ovoid, mericarps acutely ribbed; 2–3 canals per vallecule, 2–4 toward commissure. August.

Meadows in subalpine belt. — Centr. Asia: Pam. -Al. Endemic. Described from the Tupalang River valley. Type in Tashkent.

Note. A. I. Vvedenskii, curator of the Herbarium of the Central Asian State University, kindly let us see the type of *Vvedenskia pinnatifolia* Korov. Unfortunately, these specimens lack ripe fruits, and there is not enough evidence to separate them as a new genus. Since this most closely resembles *Conioselinum* it is here included in that genus, but more material is required.

Genus 1038. **OSTERICUM** * Hoffm.

Hoffm. Gen. Umbell. (1816) 162. — *Ostericum* Hoffm. ex Endl. Gen. Pl. (1836) 778. — *Gomphopetalum* Turcz. in Bull. Soc. Nat. Mosc. (1841) 547, ex p. — *Angelica* sect. *Ostericum* Maxim. in Mém. Biol. IX (1873) 249, part. — *Angelica* subgen. *Ostericum* Maxim. ex Drude in E. u. P. Pflanzenfam. III, 8 (1898) 220

Calyx-teeth conspicuous; petals white, broadly ovate, slightly notched; fruit ovoid-oblong, dorsally compressed; mericarps with protruding hollow dorsal and winged lateral ribs, remote from each other, not appressed. Pericarp thin, 1 layer of cells becoming partly or fully separated from seed in ripe fruits; albumen flat toward commissure; carpophore bipartite. Biennial or perennial herbs with 2–3-pinnate leaves and geniculately curved blade.

Monotypic genus, common to Europe and Siberia where it reaches the Yenisei River in the east.

1. *O. palustre* Bess. Enum. pl. Volhyn., Podol. (1822) 94; Ldb. Fl. Ross. II, 295; Kryl., Fl. Zap. Sib. VIII, 2056. — *O. pratense* Hoffm. Gen. Umbell. ed. 2 (1816) 164. — *O. albiflorum* Kitagawa in the Journ. of Japan. Botany, XII, 4–5 (1935) 236. — *Imperatoria palustris* Bess. Prim. Fl. Galiz. (1809) 214. — *Angelica pratensis* M. B. ex Fisch. Cat. Hort. Gorenk. (1812) 45, nom. nud.; Spreng. Umbell. Prodr. (1813) 60. — *A. palustris* Bess. Enum. (1822) 13; Shmal'g., Fl. I, 404. — *A. albiflora* Benth. ex Maxim. in Mém. Biol. IX (1873) 253; Kom., Fl. Man'chzh. III, 165. — *Gomphopetalum albiflorum* Turcz. in Bull. Soc. Nat. Mosc. (1841) 539; Ldb. Fl. Ross. II, 294. — Ic.: Syreishch., Illyustr. Fl. Mosk. gub. II (1907) 412. — Exs.: G. R. F. No. 2620.

* Apparently from the Greek *hysterikos* —womb; referring to use of this plant in the treatment of hysteria.

Biennial or perennial; dying after 2–3 years following fruiting; stem 40–120 cm high, hollow, ribbed, branching in upper part, slightly scabrous; leaves on stem 2–4, broadly triangular, 10–20 cm long and as wide, 2–3-pinnate, with geniculate curved blade, leaflets not in one plane, covered with short spines; acutely scabrous beneath along petioles and nerves; leaflets on petiolules, ovate, acuminate, subulate-dentate, 2–7 cm long, 1–5 cm wide, terminal slightly cordate, lateral secund; upper leaves reduced, with 11 rather large, expanded, amplexicaul sheaths diverging from stem. Umbels 5–7 cm across, of 8–30 glabrous rays acutely scabrous only at tip; involucre absent or few-leaved; umbellets ca. 7–8 mm across; involucels of many lanceolate or linear-subulate leaflets shorter than pedicels, sometimes leaflets unequal and short-connate; pedicels covered with short papilliform spines, especially in upper part; calyx-teeth ovate, 0.3–0.5 mm long; petals white, broadly ovate, slightly notched, 1–1.5 mm long; fruit ovoid-oblong, 4–6 mm long, 2.5–4 mm wide, marginal wings ca. 1 mm wide. July–August.

Marshes, damp stream banks, damp meadows, sometimes solonchak meadows. — European part: Balt., Lad.-Ilm., U. Dnp., U. V., V.-Don, V. -Kama, Transv., U. Dns., Bess. (?), M. Dnp., Bl., L. V.; W. Siberia: U. Tob., Ob, Irt., Alt., E. Siberia: Ang. -Say.; Centr. Asia: Ar. -Casp. Gen. distr.: Centr. Eur. Described from Galicia. Type in Kiev.

Genus 1039. **ANGELICA** * L.

L. Sp. pl. (1753) 250. — *Gingidium* Forst. Char. Gen. (1776) 41. — *Callisace* Fisch. in Hoffm. Gen. Umbell. ed. 2 (1816) 170. — *Gomphopetalum* Turcz. in Bull. Soc. Nat. Mosc. XIV (1841) 599, p.p. — *Czernaevia* Turcz. op. cit. XVII (1844) 739. — *Angelophyllum* Rupr. Beitr. Pflk. Russ. Reich. XI (1859) 8. — *Porphyroscias* Miq. in Ann. Mus. Bot. Lugd. -Batav. III (1867) 62. — *Angelocarpa* Rupr. Sert. tiansch. (1869) 48

Calyx-teeth inconspicuous; petals usually white, with inward curved tip; ovary abruptly tapering at base; stylopodium pulviniform; fruit ovoid or elliptic-oblong, dorsally compressed; mericarps 5-ribbed, dorsal ribs thickish-filiform or slightly winged, marginal ribs winged, divergent. Mesocarp spongy in ribs, membranous in valleculeae; canals solitary in valleculeae; albumen nearly flat toward commissure; carpophore bipartite. Biennial or perennial herbs, with fistular stem and large tripinnate leaves.

Up to 50 species in the northern temperate zone of Europe, Asia and North America.

1. Terminal leaf lobes lanceolate-linear, 2–3 mm wide, entire 10. *A. maximowiczii* (Fr. Schmidt) Benth.
- 12 + Terminal leaf lobes ovate or lanceolate, 0.5–6 cm wide, dentate 2.
2. Sheaths of upper leaves thick, short-haired outside 3.
- + Sheaths of upper leaves always glabrous outside 6.

* From the Latin *angelus* (Greek *angelikos*) — angel, i.e., the curative effect of the plant revealed by angels.

3. Sheaths of upper leaves markedly inflated, broadly ovate; main umbel of 25–80 rays 4.
- + Sheaths of upper leaves oblong-cylindrical, amplexicaul, not inflated; main umbel of 15–35 rays 5.
4. Main umbel of 60–80 rays, plant 2–3 m high, leaves completely glabrous beneath (Far East) 12. *A. ursina* (Rupr.) Rgl. et Schm.
- + Main umbel of 25–55 rays, plant 20–100 cm high, leaves short-haired beneath (Centr. Asia) 14. *A. brevicaulis* (Rupr.) B. Fedtsch.
5. Umbellet rays (pedicels) and young fruit glabrous 6. *A. anomala* Lallem.
- + Umbellet rays (pedicels) and young fruit scabrous-hairy 7. *A. jaluana* Nak.
6. Leaves bi- or nearly triternate, with broadly ovate leaves abruptly passing into long petioles; involucre and involucels absent (Centr. Asia) 13. *A. ternata* Rgl. et Schmalh.
- + Leaves 2- or 3-pinnate, commonly with sessile or short-petioluled terminal lobes; involucels present 7.
7. Stem not hollow, with strongly protruding ribs, sometimes angular-ribbed; involucre of 1–3 herbaceous leaves, resembling inflated leafless sheaths, which always subtend umbel; stems usually entirely violet at flowering 16. *A. decursiva* (Miq.) Franch.
- + Stems hollow, cylindrical; involucre absent 8.
8. Stems thin, 50–100 cm high; 3–8 mm thick; umbels rather small, 3–9 cm across; peduncles glabrous 9.
- + Stems 100–200 cm high, 25 mm thick, central umbel 9–15 cm across, below umbel peduncles short-haired over almost entire internode 11.
9. Terminal leaf lobes lanceolate or linear-lanceolate, 2–4 cm long, 0.2–10 mm wide; main umbel of 20–30 rays 15. *A. czernaevia* (Fisch. et Mey.) Kitag.
- + Terminal leaf lobes ovate, 2–8 cm long, 1.5–5 cm wide, umbel of 10–20 rays 10.
10. Petals usually greenish, abruptly tapering to rather long claw nearly as long as blade; stem angularly and acutely ribbed 8. *A. viridiflora* (Turcz.) Benth.
- 13 + Petals white, rarely pink, tapering to short claw; fruit with obtuse protruding ribs 9. *A. koreana* Maxim.
11. Dorsal ribs in fruit obtuse, slightly inflated, hollow 11. *A. dahurica* (Fisch.) Benth.
- + Dorsal ribs acute, sometimes nearly winged, or filiform and not hollow 12.
12. Leaves geniculately curved below, petiolules and nerves with short stiff hairs above and beneath, rhizome with transverse septa seen in longitudinal section 3. *A. refracta* Fr. Schmidt.
- + Leaves not as above, leaflets slightly scabrous above or beneath only or glabrous on both sides; rhizome different 13.
13. Fruit with clearly distinguishable dark-colored resinous canals, broader than dorsal ribs (Far East) 14.
- + Resinous canals narrow, inconspicuous 15.

14. Leaflets of involucels pubescent, leaves glabrous on both sides . . .
..... 4. *A. sachalinensis* Maxim.
+ Leaflets of involucels glabrous or slightly pubescent. Leaves
short-scabrous along nerves above, glabrous beneath.
..... 5. *A. amurensis* Schischk.
15. Leaflets markedly scabrous along nerves above, often large,
8–9 cm long, 3.5–4.5 cm wide (Caucasus) . . . 2. *A. pachyptera* Lallem.
+ Leaflets not as above, sometimes entirely subglabrous (European
part of USSR and Siberia) 1. *A. silvestris* L.

Section 1. EU-ANGELICA DC. Prodr. IV (1830) 167. — Calyx-teeth inconspicuous; petals white, oblong-lanceolate, with inward curved, slightly notched margin; fruit with membranous marginal wings; canals in valliculae, single, superficial, 2 toward commissure.

1. *A. silvestris* L. Sp. pl. (1753) 251; Ldb. Fl. Ross. II, 296; Shmal'g., Fl. I, 404; Kryl., Fl. Zap. Sib. VIII, 2054; Grossg., Fl. Kavk. III, 173. — *A. silvestris* a. *vulgaris* Lall. in Ind. sem. Hort. Petrop. IX (1842) 59. — *A. villosa* Lag. Gen. et sp. nov. (1816) 61. — *A. pratensis* J. et C. Presl, Fl. Čech. (1819) 61, non M. B. — *A. macrophylla* Schur, Enum. Transsilv. (1866) 262. — *Selinum sylvestre* Crantz, Stirp. Austr. I (1762) 177, non L. — *S. Angelica* Roth, Tent. Fl. Germ. I (1788) 133. — *S. pubescens* Moench, Meth. (1794) 80. — *Athamanta silvestris* Web. in Wigg. Prim. Fl. Holsat. (1780) 26. — *Peucedanum Angelica* Caruel in Parl. Fl. Ital. VIII (1889) 28. — Ic.: Syreishch., III. Fl. Mosk. gub. II, 43. — Exs.: G. R. F. No. 618.

Perennial; stem 70–200 cm high, 1–2.5 cm thick, cylindrical, hollow, furrowed, with glaucous bloom, glabrous or with very short hairs directly below umbel, branching above; leaves 2–3-pinnate, long-petioled, broadly triangular, sheaths sacciformly inflated, blades of lower leaves 30–60 cm long, nearly as wide, leaflets 2.5–9 cm long, 1–4 cm wide, ovate or oblong, finely and acutely serriform-dentate, short-cuneate or the upper slightly decurrent, obscurely scabrous nerves above, glabrous beneath. Umbels of 15–30 rays with short, stiff hairs; involucre absent or of 1–2 linear caducous leaflets; umbellets 1–2 cm across; involucels of many linear leaflets, nearly as long as pedicels; calyx-teeth inconspicuous; petals white, ca. 1.5 mm long, entire fruit broadly ovoid, 5–6 mm long, 3.5–5 mm wide, dorsally compressed, with strongly protruding midribs; marginal ribs winged; canals single under valliculae; carpophore bifurcate. June–July.

Along edges of coniferous, mixed and birch forests, inundated meadows, moss and sedge bogs. — European part: Kar. -Lap., Dv. -Pech., Lad. -Ilm., Balt., U. V. V. -Kama, U. Dnp., M. Dnp., V. -Don, Transv., U. Dns., Bes., Bl., (?), L. Don; W. Siberia: everywhere; E. Siberia: Yenisei, Ang. -Say., Lena-Kol., Dau. (west only). Gen. distr.: Scand., Centr. Eur. Described from Europe. Type in London.

2. *A. pachyptera* Lallem. in Ind. sem. Hort. Petrop. IX (1842) 58; Boiss. Fl. or. II, 978; Grossg., Fl. Kavk. III, 173. — *A. silvestris* Boiss. Fl. or. II, 978, quo ad pl. cauc.; Grossg., Fl. Kavk. III, 173,

non L. — *A. silvestris* subsp. *pachyptera* Nym. Consp. Fl. europ. I (1878) 283. — *A. silvestris* var. *elatio*r Grossh. I. c. non Wahlenb.

Perennial; root rather thick; stem 70–200 cm high, 0.5–1 cm thick, single, hollow, furrowed, with glaucous bloom, sometimes violet, slightly branching above, glabrous, terminal internode only almost entirely covered with scabrous hairs; leaves 2–3-pinnate, broadly triangular, their long petioles with sacciformly inflated sheaths, blade of lower leaves 40–60 cm long, nearly as wide; leaflets 2–9 cm long, 1–4.5 cm wide, ovate, finely and acutely serriform-dentate, cuneate or obscurely cordate at base, lower short-petioluled, median sessile, upper often slightly decurrent, glabrous, paler beneath than above, very scabrous along nerves above. Umbels of 15–30 unequal rays with short scabrous hairs; involucre absent or of 1–2 linear caducous leaflets; umbellets 1–2 cm across; involucels of 7–13 lanceolate-linear or linear, finely acuminate, glabrous or slightly pubescent leaflets nearly as long as pedicels; petals white or pink, 1–1.5 mm long, entire fruit broadly ovoid, 3–5 mm long, nearly as wide, the median ribs strongly protruding, the lateral broadly winged. July–August.

Riverbanks, coastal debris, waterfalls, shrubby formations, riparian mountain woodlands. — Caucasus: Cisc. (W.), Dag., W. and E. Transc. Endemic. Described from the Caucasus. Type in Leningrad.

3. *A. refracta* Fr. Schmidt in Mém. Acad. Pétersb. VII, 12 (1868) 138; Kom., Fl. Kamch. II, 345. — *A. genuflexa* Hult. Fl. of Kamtch. III, 167, non Nutt. — Ic.: Sugaw. III. Fl. of Saghal. III (1940) tab. 646.

Perennial; rhizome vertical, 1–1.5 cm thick, hollow, with fragmented transverse septa, seen in longitudinal section; stem 80–120 cm high, 1–1.5 cm thick, hollow, glabrous, short-haired in upper internode only, branching above; leaves 30 cm long, 20–26 cm wide, 2-pinnate, green above, paler beneath, nerves on both sides, petioles and petiolules short-scabrous-hairy with long petiole gradually passing into oblong, broadly triangular sheath; lower primary lobes more or less long-petioluled, petiolules decreasing in size toward apex, all more or less divergent below, terminal lobes ovate or ovate-lanceolate, acuminate, unequally serrate-dentate, second and truncate at base, short-petioluled or upper lobe sessile, 4–11 cm long, 1–4 cm wide, green above, paler beneath. Central umbel 16 cm across, larger than the lateral, of 40–80 distally scabrous-haired rays; involucre absent; umbellets 1.5–2 cm across, with scabrous-hairy pedicels; involucels of many filiform-subulate, scabrous-hairy leaflets as long as umbellet; lateral umbellets 4–5 cm across; fruit ellipsoid, 4.5–5 mm long, 4 mm wide, with 3 protruding, hardly winged, hollow dorsal and winged lateral (to 1 mm wide) ribs. Fl. July–August, Fr. September.

Damp meadows, reed grass thickets. — Far East; Sakh., Kamch., Okh. Gen. distr.: Bering. Described from Sakhalin. Type in Leningrad.

18 Note. Schmidt's name is retained because we could not establish the identity of the present species with the North American *A. genuflexa* Nutt.; Hulten persistently maintains this identity because of inadequate material from America. One of the typical characteristics of *A. refracta* Schmidt is the structure of the rhizome, which longitudinal sections show to be divided into many small chambers by transverse septa. All the American specimens in the Biological Institute of the Academy of

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PLATE II. 1 — *Angelica brevicaulis* (Rupr.) B. Fedtsch.; 2 — *A. ternata* Rgl. et Schmalh.

Sciences of the USSR lack underground parts. If one day such septa will be found in the American plant, then it may be regarded as identical with the Far Eastern plant for above ground there are no differences between them.

Section 2. *ANISOPLEURA* Maxim. Prim. Fl. amur. (1859) 127. — Dorsal ribs filiform, the marginal broadly winged, canals in valliculae superficial, nearly black in color, much wider than dorsal ribs.

4. *A. sachalinensis* Maxim. Prim. Fl. amur. (1859) 127. — *A. Kawakamii* Koidz. Fl. Symbol. Or.-Asiat. (1930) 45. — Ic.: Sugaw. III. Fl. Saghal. III (1940) tab. 645.

Perennial; stem 1–2.5 m high, 1.5–2 cm thick, hollow, glabrous, upper internode densely covered with short hairs, branching; radical leaves broadly triangular, 30–50 cm long, nearly as wide 2- or nearly 3-pinnatisect, their more or less long petioles abruptly passing into inflated sheaths; primary lobes on more or less long petiolules, lobes of last order ovate or ovate-lanceolate, 5–12 cm long, 2–4.5 cm wide, the lower petioluled, others sessile, often decurrent, bright green above, paler beneath, glabrous above and beneath, with broadly triangular, acute, antrorse teeth; lower cauline leaves similar to radical, upper leaves smaller, in the uppermost blade obsolete, sessile on strongly, sometimes nearly spherically inflated sheath. Umbels 8–17 cm across, of 20–50 nearly equal, short-scabrous rays; involucre absent; umbellets 1–1.5 cm across, 30–40-flowered, with pubescent pedicels; involucels of 5–9 linear, herbaceous, unequal, erect, caducous leaflets; petals white or slightly pink, 1.5 mm long, notched, with inward curved lobe; fruit broadly ovoid, 4–6 mm long, 3–4.5 mm wide; mericarps with 3 protruding dorsal and broadly winged lateral ribs; canals single in valliculae, taking up entire space between ribs; stylopodium short-pyramidal, with slightly undulant base; styles reflexed, 2–2.5 times as long as stylopodium. July–August, Fr. September. (Plate VIII, Figure 8.)

Shrubby formations, willow woods. — Far East: Sakh. Endemic. Described from W. Sakhalin. Type in Leningrad.

5. *A. amurensis* Schischk. sp. nova in Addenda XVI, 352. — *A. anomala* auct. plur. Fl. Extremiorient. non Lallem.

Perennial; stem 80–200 cm high, hollow, glabrous, distal internode only short-scabrous-hairy branching; radical leaves 40 cm long, 30 cm wide, 3-pinnate; cauline leaves with petioles shorter than blade, 3-pinnatisect, with 2 pairs of primary lobes, terminal lobes ovate, lower petioluled, sometimes with 1–2 basal lobes or sessile, upper decurrent, acute, with narrowly triangular, unequal acuminate, antrorse teeth, dark green and scabrous along nerves above, paler beneath, glabrous along nerves, blades of uppermost leaves much reduced, sessile on strongly, nearly globularly inflated sheath. Umbels 10–20 cm across, of 20–40 acutely scabrous-hairy rays; involucre absent; umbellets 30–40-flowered, with short, hairy pedicels; involucels of 5–7 linear-lanceolate, nearly entire, scarious, often violet, caducous, sparingly hairy leaflets; petals white, ca. 1 mm long, not deeply notched; fruit broadly ovoid or subglobular, ca. 5 mm long, 4 mm wide; mericarps with

3 protruding dorsal and broadly winged marginal ribs; canals single in valleculae, taking up entire space between ribs; stylopodium short-conical; styles reflexed, $1\frac{1}{2}$ –2 times as long as stylopodium. Fl. July–August, Fr. August–September. (Plate VIII, Figure 7.)

Oak forests, oak-birch forests, shrubby formations, meadows. — Far East: Ze.-Bu., Uda, Uss. Gen. distr.: Ch. (N.), Jap. Described from the Khabarovsk area. Type in Leningrad.

Section 3. *STENOPHYLLIUM* Schischk. sect. nov. in Addenda XVI, 353. — Fruit ovoid, narrowly winged along margins, dorsal ribs filiform, hardly protruding; terminal lobes oblong or lanceolate, 2–5 cm long, 0.5–1.5 cm wide; sheath of upper leaves cylindrical-oblong, finely velutinous outside.

6. *A. anomala* Lall. in Ind. sem. Hort. Petrop. IX (1842) 57 et Suppl. ad Ind. IX, 22; Turcz. Add. Fl. baic.-dah. p. XXVIII. — *A. montana* β . *angustifolia* Ldb. Fl. Ross. II (1844–1846) 295. — *A. sylvestris* β . *angustifolia* Turcz. in Bull. Soc. Nat. Mosc. XVII (1844) 738. —
20 *Peucedanum angelicifolium* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 93, nom. nud. et l. c. XVII (1844) 738 nom.

Perennial; root erect, 0.6 cm thick; stem 40–150 cm high, hollow, cylindrical, thinly ribbed, finely and obscurely velutinous below, more densely so along upper internodes, branching above; radical and lower cauline leaves on long petioles abruptly passing into oblong, very short-haired sheath, 2-pinnate, 18–25 cm long, 12–15 cm wide; primary lobes petioluled; lobes of last order oblong, broadly or narrowly lanceolate, sessile; upper decurrent along petioles, acute, acutely serrate, 3–5 cm long, 0.5–1.5 cm wide, glaucescent beneath, glabrous; sheaths of median and upper leaves oblong-cylindrical, amplexicaul, nearly not divergent, densely covered with short hairs on outside; upper leaves smaller, cut into linear lobes, sessile on slightly divergent cylindrical sheath. Umbels 3–14 cm across, or 20–35 scabrous-hairy rays; involucre absent; umbel rays glabrous; umbellets ca. 1 cm across; leaflets of involucels 3–5, subulate-linear, caducous, sometimes absent; petals white; fruit ovoid, 6 mm long, 4 mm wide; dorsal ribs protruding, acute, marginal winged, wings ca. 1 mm wide; stylopodium conical; styles reflexed, twice as long as stylopodium. July.

Banks of rivers and streams, damp forest plots, willow woods. — E. Siberia: Dau. Endemic. Described from the Argun River. Type in Leningrad.

Note. Until recently, this species was widespread in the vicinity of the Amur. Our *A. amurensis* Schischk. was erroneously taken for *A. anomala* Lall. The authentic *A. anomala* has a very limited distribution area, being confined to the Argun River in E. Siberia. A typical character of *A. anomala* sensu stricto is the external pubescence of the sheath of the upper leaves and on the lower side of the small leaflets.

7. *A. jaluana* Nak. in Bot. Mag. Tokyo, XXVIII (1914) 314.

Perennial; root vertical, 0.8 cm thick; stem 80–100 cm high, 0.5 cm across, erect, violet, thinly ribbed, branching above, glabrous below, short-scabrous-hairy in upper half; leaves ovate-triangular, 30 cm long, 25 cm wide, 2- or nearly 3-pinnate, their short petioles passing into long

cylindrical, amplexicaul sheath, velutinous in upper leaves; lobules of last order narrow-ovate, acute or acuminate, acutely and finely toothed, 2–4 cm long, 0.5–1.5 cm wide. Umbels 5–10 cm across, of 18–30 scabrous-hairy, unequal rays; involucre absent or of 1 deciduous leaflet; umbellets ca. 1 cm across; pedicels short-scabrous; involucels of 3–7 filiform leaflets; calyx-teeth inconspicuous; petals white, ovate, with dark midrib, notched, with very short inward curved tip; fruit ovoid, 4 mm long, 2 mm wide, with filiform dorsal and narrowly winged marginal ribs thinly covered with short sparse hairs. July–August.

Gravels and clayey-sandy floodplains of rivers – Far East: Uss., Ze.-Bu. (Tyрма River basin). Gen. distr.: Jap.-Ch. Described from the Yalu River valley in N. Korea. Type in Tokyo.

Section 4. GOMPHOPETALUM (Turcz.) Schischk. comb. nov. –
Genus *Gomphopetalum* Turcz. in Bull. Soc. Nat. Mosc. (1841) 579;
Ldb. Fl. Ross. II, 294. – Calyx-teeth ovate, persistent; petals with well defined claws, white or greenish; fruit ellipsoid, with filiform dorsal and winged marginal ribs, stems with acute or obtuse protruding ribs.

8. *A. viridiflora* (Turcz.) Benth. ex Maxim. in M  l. Biol. IX (1873) 253; Kom., Fl. Man'chzh. III, 166. – *Gomphopetalum viridiflorum* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 93, nom. nud. et op. cit. (1841) 540 (descr.); Ldb. Fl. Ross. II, 294; Turcz. Fl. baic.-dah. I, 500. – *Ostericum viridiflorum* Kitagawa in Journ. of Japanese Botany, XII, 4–5 (1935) 232. – Ic.: Kom. and Alis., Opred. rast. Dal'nevost. kr. II, tabl. 250 (1932).

Biennial or perennial; root 0.5–1 cm thick, erect, entire plant glabrous; stems 50–100 cm high, branching above or from middle, angular-ribbed; all except uppermost leaves with long petioles gradually passing into sheath, sheath usually much longer than blade, this 2-pinnate, triangular, 10–20 cm long, 13–20 cm wide; primary lobes petioluled, pinnatisect, into sessile or short-petioled, ovate, acute or acuminate, 3–8 cm long, 1.5–5 cm wide, unequally and acutely dentate, leaflets secund at base. Central umbel subsessile or on 0.5–3 cm long stalks, lateral umbels usually on long stalks, at base of central umbel; umbels 4–9 cm across, of 13–15 glabrous or obscurely scabrous rays; involucre absent; umbellets ca. 1 cm across; involucels of 5–9 linear-lanceolate, acute, unequal leaflets, shorter than pedicels; fruit ovoid, 6–7 mm long, 4.5 mm wide, deeply notched at base, dorsal ribs filiform, marginal winged, wings ca. 1.5 mm broad. Fl. July–August, Fr. September.

22 Meadows, frequently in damp, shrubby formations; forest edges. – E. Siberia: Dau.; Far East: Ze.-Bu., Uss. Gen. distr.: Manchuria. Described from the area between Chimdant and Nerchinsk. Type in Leningrad.

9. *A. koreana* Maxim. in M  l. Biol. XII (1886) 471; Kom., Fl. Man'chzh. III, 161. – *Ostericum koreanum* Kitag. in The Journal of Japanese Botany, XII, 4–5 (1935) 235.

Perennial; stems 80–100 cm high, cylindrical, glabrous, scabrous-hairy only under umbel, with distinctly protruding obtuse ribs, slightly branching; leaves bi- or triternatisect, broadly triangular, 36–40 cm wide; lower leaves with petiole gradually passing into oblong amplexicaul sheath; secondary lobes petioluled, lobes of last order oval, 2–4 cm long, 1.5–3.5 cm wide, acute, nearly trifid, emarginate-serrate with acute teeth, scabrous along nerves on both sides, uppermost leaves very small, sessile on linear-lanceolate, not inflated sheath. Umbels 6–7 cm across, of 10–20 scabrous rays; involucre of 3–7 lanceolate-linear erect leaflets; umbellets ca. 1 cm across; involucels of 5–7 linear or narrowly lanceolate acute leaflets; calyx-teeth conspicuous, persistent; petals white, rounded, tapering to very short claw, notched, with inward curved lobule; fruit nearly tetragonal, 6 mm long, 5 mm wide, dorsal ribs filiform, marginal winged, wings 1.5 mm wide; 1 canal per vallecule, 2 toward commissure. Fl. August, Fr. September–October.

Meadows and shrubs. — Far East; Uss. Gen. distr.: Korea. Described from the coast of Pos'tet Bay. Type in Leningrad.

10. *A. maximowiczii* (Fr. Schmidt) Benth. ex Maxim. in Mél. Biol. IX (1873) 253; Kom., Fl. Man'chzh. III, 163. — *Gomphopetalum Maximowiczii* Fr. Schmidt in Maxim. Prim. Fl. Amur (1859) 126. — *Ostericum Maximowiczii* Kitag. in The Journal of Japanese Botany, XII, No. 4–5 (1935) 232. — *Peucedanum vaginatum* var. *glabrum* Freyn in Österr. Bot. Zeitschr. (1902) 111, non Turcz. — Ic.: Kom. and Alis., Opred. rast. Dal'nevost. kr. tabl. 248 (1932); Sugaw. III. Fl. of Saghal. III (1940) tab. 647. — Exs.: G. R. F. No. 2603; F. Karo, Pl. amur. et zeans. No. 383 (sub *Peucedanum vaginatum* α *glabrum*).

- 23 Perennial; stem 80–100 cm high, glabrous, cylindrical, simple or branching above; lower leaves 2-pinnate, long-petioled, their blade triangular-ovate, 10 cm long, 7 cm wide; lower primary lobes pinnatisect into oblong-linear, acuminate, entire, 2.5–5 cm long, 2–3 mm wide lobules acutely scabrous along margins and lower side of midrib; upper leaves tripartite, with linear-lanceolate, acuminate, usually entire segments; uppermost leaves reduced to oblong, often violet sheath. Umbels 4–6 cm across, of 9–11 rays scabrous above or subglabrous; involucre of 1–4 unequal, caducous leaflets; umbellets 1–1.5 cm across; involucels of 5–7 linear-filiform, acuminate leaflets; calyx of 5 ovate acuminate teeth, one larger than the rest; petals obcordate, ca. 1.5 mm long, white, with inward curved tip, abruptly tapering to claw; fruit broadly ovoid, 5 mm long, 4.5 mm wide, dorsal ribs subfiliform, marginal winged, wings 1.75 mm wide; 1 canal per vallecule, 1 toward commissure. Fl. July–August, Fr. September.

Swampy meadows, birch forests, coniferous forests, burnt areas. — Far East: Ze.-Bu., Uda, Sakh., Uss. Gen. distr.: Manchuria, Korea. Described from the lower reaches of the Amur River (De-Kastri port). Type in Leningrad.

Section 5. *CALLISACE* (Fisch.) Drude in E. u. P. Pflanzenfam. III, 8, (1898) 220. — Genus *Callisace* Fisch. in Hoffm. Gen. Umb. ed. 2 (1816) 170, excl. sp. — Petals white; fruit dorsally compressed, nearly ovoid,

notched at base, laterally winged; mericarps with 3 thick obtuse dorsal ribs including oval, sclerenchymatous fascicle, lateral ribs winged; vallecule narrow, with 1 canal, 2 canals toward commissure; carpophore bipartite at apex.

11. *A. dahurica* (Fisch.) Benth. et Hook. ex Franch. et Sav. Enum. pl. Japon. I (1875) 187. — *A. glabra* Makino in Sinuma, Somoku-Dzusetsu, I, 5 (1907) 43. — *Callisace dahurica* Fisch. in DC Prodr. IV (1830) 184; Ldb. Fl. Ross. II, 316; Turcz. Fl. baic.-dah. 1, 506. — *Thysselinum dahuricum* Spreng. Syst. Veg. I (1825) 805. — Ic.: Kom. and Alis., Oprod. rast. Dal'nevost. kr. tabl. 249; Makino, l. c. tab. 36.

Perennial; root ca. 2.5 cm thick; stem 100–150 cm high, 2–3 cm thick, cylindrical, hollow, thinly furrowed, often violet, glabrous below, usually upper internode with short hairs, lower leaves 2- or 3-pinnate, 30–50 cm long, 25–40 cm wide, their long petiole passing into inflated sheath; terminal lobes oblong, 2.5–5 cm long, 1–2 cm wide, acute, acutely biserrate, long decurrent along petiolules, smooth beneath, obscurely scabrous along mid-ribs above; upper leaves sessile, smooth, on large markedly inflated sheath. Umbels 10–15 cm across, of 20–40 short-haired rays; involucre absent or replaced by inflated base of terminal leaf, becoming deciduous; umbellets 2.5 cm across, dense; involucels of 14–16 lanceolate, acute leaflets, nearly as long as umbellets; fruit compressed, ellipsoid or nearly ovoid, 6 mm long, 5–6 mm wide, with obtuse, hollow dorsal and winged lateral ribs, wings 1.5 mm wide. July.

Banks of rivers and streams, mostly gravelly soil, shrubby thickets along coasts, rarely meadows. — E. Siberia: Lena-Kol. (upper reaches of Indigirka River), Dau.; Far East: Ze.-Bu., Uss. Gen. distr.: Manchuria, Korea, Japan. Described from Transbaikalia. Type in Leningrad.

Section 6. ANGELOPHYLLUM (Rupr.) Drude in E. u. P. Pflanzenfam. III. 8 (1898) 220. — Genus *Angellophyllum* Rupr. Revis. der Umbellif. aus Kamtschatka (1859) 8. — Mericarps with 3 acute dorsal ribs; canals under vallecule superficial, single, 2–4 toward commissure. Sheath of upper leaves much inflated, velutinous outside.

12. *A. ursina* (Rupr.) Rgl. et Schmalh. in Tr. Bot. Sada. V (1878) 590. — *Angellophyllum ursinum* Rupr. Revis. der Umbell. aus Kamtschatka (1859) 8. — Ic.: Sugawara, Fl. of Saghal. III (1940) tab. 644.

Perennial; stems 1–2.5 m high, 3 cm thick, hollow, glabrous, upper internode only, densely covered with short velutinous hairs; leaves broadly triangular or broadly oval, 40–50 cm long, 20–30 cm wide, green above, paler beneath, slightly scabrous along nerves, glabrous, 2-pinnate; lower leaves with petiole abruptly passing into large inflated sheath; primary lobes petioluled, secondary sessile (upper decurrent), ovate, unequally serrate-dentate, 4–13 cm long, 1.5–6 cm wide, acuminate; upper leaves sessile on much inflated sheath, densely covered outside with very short velutinous hairs. Central umbel 15–20(30) cm across, of 40–50 velutinous rays; involucre of 1–2 linear-subulate leaflets or absent; umbellets 1–1.5 cm across; fruit 6 mm long, 5 mm wide, with narrowly winged dorsal and broadly winged lateral ribs. Fl. July–August, Fr. September.

Along edges of coniferous and birch forests, dry valley meadows. — Far East: Kamch., Sakh. Endemic. Described from Kamchatka. Type in Leningrad.

Section 7. MESANGELICA Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 590. — Endocarp contiguous with seed, separated from pericarp by its outer layers, canals single under valliculae, 2 toward commissure. Leaves bi- or triternate, leaflets broadly ovate, long-petioluled.

- 25 13. *A. ternata* Rgl. et Schmalh. in Tr. Bot. Sada, V, 2 (1878) 590 (*tornata*), nom. nud.; Izv. Obshch. lyubit. estestv. antrop. i etnogr. XXXIV, 2 (1882) 32. — *A. Stratoniana* Aitch. et Hemsl. in Journ. Linn. Soc. XIX (1882) 164. — *Callisace ternata* K. -Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 179. — Ic.: Aitch. et Hemsl. l. c. tab. 13.

Perennial; root thick, ca. 1 cm; stem 30–60 cm high, cylindrical, hollow, thinly furrowed, slightly branching above, like leaves glabrous; radical leaves broadly triangular, 20–30 cm long, 15–20 cm wide, bi- or nearly triternate, short-petioled; secondary lobes on longer petiolules; leaflets broadly ovate, obtuse, unequally toothed, abruptly tapering to more or less long petiole, sometimes cordate (var., *cordifolia* Rgl. et Schmalh.), smooth, somewhat shiny, 4–6 cm long, 3–6.5 cm wide. Central umbel 8–15 cm across, larger than the lateral, of 9–22 smooth rays; lateral umbels 3.5–5 cm across, of 8–10 rays; involucre absent; umbellets 1.5–2 cm across, with smooth pedicels; involucels absent or of 1–2 small recurved leaflets; fruit ovoid, 10 mm long, 5 mm wide, dorsal and lateral ribs winged, wings 1.5–2 mm wide. July. (Plate II, Figure 2.)

Moist taluses, near glaciers, banks of streams, to 3,400 m. — Centr. Asia: T. Sh., Pam. -Al. Gen. distr.: Sinkiang. Described from the road from Isfairam to Alai. Type in Leningrad.

Section 8. ANGELOCARPA (Rupr.) Schischk. comb. nov. — Gen. Angelocarpa Rupr. Sert. tianschan. (1869) 48. — Fruit with 3 membranous dorsal and broader marginal ribs, with 10 dorsal and 6 commissural canals. Leaves subcoriaceous, leaflets small, bilaterally scabrous.

14. *A. brevicaulis* (Rupr.) B. Fedtsch. in Perech. rast. Turkest. III (1909) 99. — *A. soongorica* Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 590. — *Angelocarpa brevicaulis* Rupr. in Sert. tianschan. (1869) 48. — *Archangelica decurrens* β . *alpina* Herder in Bull. Soc. Nat. Mosc. XXXIX, 3 (1866) 77. — *A. brevicaulis* Rchb. in Journ. of Bot. XIV (1876) 45. — *A. songarica* Lipsky ex Pauls. in Kjoeb. Vidensk Meddel. (1903) 43. — *Coelopleurum brevicaulis* Drude in E. u. P. Pflanzenfam. III, 8 (1898) 212.

- Perennial; root thick, to 3 cm across, erect; stem 15–160 cm high, 0.7–1.5 cm across, glabrous, rather thick, ribbed, hollow, simple or slightly branching; radical leaves broadly triangular, 10–20 cm long and as wide,
26 2- or 3-pinnate, their more or less long petioles abruptly passing into inflated sheath, acutely scabrous outside along nerves; primary lobes

petioluled, simple-pinnate; lower leaflets sometimes pinnatisect, terminal lobes ovate, acute, sometimes unequally and acutely toothed, 3–14 cm long, 1.5–5 cm wide, scabrous along nerves, paler beneath, sheath scabrous outside along nerves. Central umbel much larger than lateral, 15–20 cm across, of 25–55 unequal, slightly scabrous rays (especially in upper part) or nearly smooth; lateral umbels 6–7 cm across; involucre absent; umbellets ca. 1.5 cm across; involucels of 8–17 lanceolate-linear or linear, acute more or less broadly scarious leaflets with faintly ciliate margin; calyx-teeth inconspicuous; stylopodium short-conical; styles curved outward, twice as long as stylopodium; fruit ellipsoid, 8 mm long, 5.5 mm wide, 3 dorsal ribs winged, the marginal slightly wider. Fl. June–July, Fr. August. (Plate II, Figure 1; Plate VIII, Figure 6.)

Banks of streams in mountain ravines, moist taluses, gravels, near glaciers to 3,400 m. — Centr. Asia: T. Sh., Pam. — Al. Gen. distr.: Sinkiang. Described from Tien Shan. Type in Leningrad.

Section 9. CZERNAEVIA (Turcz.) Schischk. comb. nov. — Genus *Czernaevia* Turcz. ex Ldb. Fl. Ross. II (1844–1846) 233; Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 93, nomen et l. c. XVII (1844) 739, descr. — *Porphyroscias* Miq. in Ann. Mus., Bot. Ludg. -Batav. III (1867) 62. — Calyx-teeth conspicuous; petals white, triangular-obcordate, with inward curved lobule, peripheral slightly elongate; fruit dorsally compressed, mericarp with 3 prominent, slightly winged dorsal ribs and 2 broadly winged lateral ones; 1–4 canals per vallecule, 4–6 toward commissure, albumen flat or slightly concave toward commissure.

15. *A. czernaevia* (Fisch. et Mey.) Kitagawa in Journ. of Japan. Bot. XII, 4–5 (1935) 241. — *Czernaevia laevigata* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 93; Fl. baic.-dah. I, 499; Ldb. Fl. Ross. II, 233. — *Angelica laevigata* Franchet, Pl. David. I (1884) 143, non Fisch. (1812, nom. nud.); Kom., Fl. Man'chzh. III, 162. — *A. flaccida* Kom., in Tr. Bot. Sada, XVIII (1901) 430; Fl. Man'chzh. III, 166. — *A. laevigata* Benth. et Hook. Gen. pl. I (1867) 917; Franch. l. c. (1884). — Ic.: Kom. in Tr. Bot. Sada, XXII (1903) Fig. 17; Kom. and Alis., Oprod. rast. Dal'nevost. kr. II, Fig. 251 (1932).

27 Perennial; root erect, ca. 1 cm thick; stems 50–100 cm high, 6–8 mm across at base, cylindrical, hollow, thinly ribbed, glabrous, scabrous only under umbel, simple or slightly branching; lower cauline leaves oblong, 20 cm long, 7 cm wide, long-petioled, 2-pinnate; lobes of last order lanceolate, 2–4 cm long, 2–10 mm wide, acute, acutely serrate, with white cartilaginous margin; upper leaves smaller. Umbels 4–9 cm across, of (10)20–30(40) rays, scabrous only above, involucre of 1 leaflet or absent; umbellets 1.5–2.5 cm across; involucel of 5–9 linear-subulate, caducous leaflets; petioles with conspicuous teeth; petals white, oboval, ca. 1 mm long, peripheral slightly elongate, 2–2.5 mm long, notched with 2 divergent lobes and obtuse inward curved tip; fruit 3–5 mm long, 2.5–4 mm wide, dorsal ribs prominent, acute, sometimes slightly winged, lateral winged, wings 0.5–0.75 mm wide. July–August.

Meadows, slopes, shrubby thickets, banks of rivers and streams. — E. Siberia; Dau., Ze.-Bu., Uss. Gen. distr.: Japan, Manchuria, Korea, N. China. Described from Transbaikalia. Type in Leningrad.

16. *A. decursiva* (Miq.) Franch. et Sav. Enum. Pl. Jap. I (1875) 187; Kom., Fl. Man'chzh. III, 167. — *Porphyroscias decursiva* Miq. in Ann. Mus. Bot. Lugd.-Batav. III (1867) 62. — *Peucedanum decursivum* Maxim. in Mém. Biol. XII (1886) 472. — *P. Porphyroscias* Makino in Tokyo Bot. Mag. XVIII (1904) 65. — *P. melanotilingia* Boissier in Bull. Herb. Boiss. sér. 2, VIII (1908) 642. — *Selinum melanotilingia* Boissier, op. cit. III (1903) 956. — Ic.: Kom. and Alis., Oprod. rast. Dal'nevost. kr. II, tab. 252.

Perennial; stems erect, furrowed, 60–100 cm high, simple, glabrous, scabrous-hairy only under inflorescence; lower and median cauline leaves petioled, simple- or 2-pinnate, their lobes broadly lanceolate or subrounded, 4–6 cm long, 0.8–4 cm wide, decurrent on petioles, acutely serrate, slightly coriaceous, with thin cartilaginous margin, scabrous along nerves above, subglabrous beneath. Umbels of 10–20 velutinous-hairy rays; involucre of 1 (rarely 2) ovate recurved leaflets 2–4 cm long, 0.5–1 mm wide; umbellets dense, ca. 1 cm across; involucels of 3–7 linear or lanceolate, unequal leaflets; calyx-teeth acute; petals white, elliptic-lanceolate, with inward curved tip; fruit elliptic-ovoid, slightly flattened dorsally, 3–5 mm long, 3 mm wide, dorsal ribs prominent, marginal narrowly winged; 2–3 canals per vallecule, 6 toward commissure. July–August. (Plate VIII, Figure 5.)

Meadows. — Far East: Uss. Gen. distr.: China, Japan. Described from Japan. Type in Holland (?).

28 Genus 1040. **ARCHANGELICA** * Hoffm.

Hoffm. Gen. Umbell. ed. 1 (1814) 162. — *Angelica* section *Archangelica* Rgl. in Tr. Bot. Sada, V, 2 (1878) 590, part.

Calyx-teeth short or inconspicuous; petals greenish or white; styles shorter than stylopodium at flowering, twice as long in fruit. Fruit ellipsoid, dorsally compressed; marginal ribs with winglike extensions slightly divergent, median carinate or narrowly winged. Canals many (20–40), nearly encircling thin inner layer of pericarp, adnate to seed, which readily separates from its wider outer layer and free inside mericarp at ripening. Biennial or perennial herbs with large stem and large, 2- or nearly 3-pinnate leaves.

To 10 species in northern part of Palearctic and mountains of Central Asia.

1. Terminal lobes obtuse or slightly cordate at base, not decurrent 28
- + Terminal lobes more or less decurrent along petioles 33
2. Dorsal ribs of mericarps thickish, obtuse, nearly pentagonal in cross section; leaflets of involucels subulate, half length of umbel rays (Balt.) 2. *A. litoralis* (Fries) Agardh.
- + Dorsal ribs of mericarps thickish-filiform; leaflets of involucels linear-subulate, nearly as long as umbellet 1. *A. officinalis* (Moench) Hoffm.

* From the Latin *archangelus* or Greek *archaggelos* — archangel, the name of the plant in Tabernaemontanus.

3. Umbel rays densely short-haired 3. *A. decurrens* Ldb.
- + Umbel rays subglabrous or obscurely scabrous 4.
4. Petals greenish, notched, umbellets 1.5–2.5 cm across involucels of 8–13 stiff-ciliate leaflets (Pam. -Al.) 4. *A. komarovii* Schischk.
5. Petals white, umbellets 0.8–1 cm across, leaflets of involucels usually glabrous (T. Sh.) 5. *A. tschimganica* (Korov.) Schischk.

1. *A. officinalis* (Moench) Hoffm. Gen. Umbell. ed. 1 (1814) 162 in nota; Ldb. Fl. Ross. II, 297; Shmal'g., Fl. I, 404; Grossg., Fl. Kavk. III, 173; 29 Kryl., Fl. Zap. Sib. VIII, 2042. — *A. sativa* Bess. Enum. Vohl. (1822) 13 part. — *A. Archangelica* Karsten, Deutsche Fl. Farm.-med. Bot. (1880–1883) 843. — *Angelica Archangelica* L. Sp. pl. (1753) 250. — *A. sativa* Mill. Gard. Dict. ed. VIII (1768) No. 1, ex p. — ? *A. major* Gilib. Fl. lithuan. II (1782) 24. — *A. officinalis* Moench, Meth. (1794) 81. — *A. procera* Salisb. Prodr. (1796) 164. — *A. intermedia* Schult. ex Steud. Nom. ed. 1 (1840) 49. — *Selinum Archangelica* Vest, Man. bot. (1806) 501. — *Ligusticum Angelica* Stokes, Bot. Mat. Med. II (1812) 96. — Ic.: Syreishch., Ill. Fl. Mosk. gub. II, 414. — Exs.: G. R. F. Nos. 2605, 2606.

Biennial or perennial; plant aromatic in all parts, dying 2–4 years after first setting fruit; rhizome thick, with whitish or yellowish milky juice; stem erect, 1–2.5 m high, cylindrical, thinly furrowed, glabrous, often with reddish-brown striae, hollow; leaves glabrous, slightly scabrous at margin and sometimes along nerves beneath, pale green, large, sometimes to 80 cm long, 3-pinnate; lobes of last order ovate or ovate-lanceolate, 5–8 cm long, usually acute, unequally incised-dentate or serrate, teeth passing into whitish mucro; terminal lobule often 3-segmented or tripartite; radical leaves with long petioles passing into large sheath; upper cauline leaves less dissected, sessile on strongly inflated sheaths with scarious margin. Umbels 8–15 cm across, terminal on main stem and branches, on long peduncles, densely hairy at apex, of 20–40 rays entirely or only adaxially sparsely covered with short hairs; involucre absent; involucels of numerous, linear-subulate leaflets, nearly as or half as long as umbel, with scabrous or short-haired margin; calyx-teeth inconspicuous; petals whitish- or greenish-yellowish, elliptic, 1–1.5 mm long, 0.75–1.25 mm wide, short-cuneate at base, slightly notched, with inward curved tip; styles short at flowering, usually shorter than broad flattish stylopodium; fruit broadly elliptic, 5–8(9) mm long, 3.5–5(6) mm wide (f. *nomocarpa* K. -Pol.) or fruit 4–5 mm long (f. *microcarpa* K. -Pol.), dorsally compressed, mericarps with 3 fine filiform or slightly keeled dorsal and 2 thickish winglike marginal ribs; canals numerous, small, encircling albumen, additional canals in dorsal ribs and 2 in each marginal rib; carpophore bipartite to base, albumen reniform in cross section. July–August.

Marshy spruce, pine-birch forests, shrubs near ditches, sedge bogs, willow wood, flooded meadows. — Arctic: Arc. Eur., European part: Kar. -Lap., 30 Dv. -Pech., Lad. -Ilm., Balt., U. V., U. Dnp., V. -Don, M. Dnp., V. -Kama, U. Dns. (?), Bes. (?); Caucasus: Cisc.; W. Siberia: Ob, U. Tob. Gen. distr.: Scand., Centr. Eur., Bal. (?). Described from W. Europe. Type in London.

Economic importance. All parts of the plant, especially the root and fruit, have a pungent odor. Juice of stem and root is liable to cause skin

irritations. When dug up in the fall, the roots contain starch and sugar, fisterine (Russian name), hydrocarotene (angelicin), angelic acid 6.3% (C_4H_7COOOH), resin, malic acid, tannin, pectin, wax and 0.25 to 1% essential oil consisting of d-phellandrene (no other terpenes), ester of methylethyl-acetic acid and hydroxypentadecylic acid ($C_{15}H_{30}O_3$). The fruits contain 1 to 1.2% essential oil. In some northern countries the young shoots are eaten. The roots and leaves contain vitamin B₁. In France the young stems and petioles are first scalded and then cooked in sugar in the production of pastries; garden angelica is also used in the making of chartreuse liqueur. *Archangelica officinalis* Hoffm. has some medicinal properties. The rhizome and roots are picked in the spring to be dried and used in the production of angelica spirit (*spiritus Angelicae compositus*), which is prescribed for improving digestion.

2. *A. litoralis* (Fries) Agardh in DC. Prodr. IV (1830) 170. — *A. officinalis* (var.) *litoralis* Alef. Landwirtschaftliche Fl. (1866) 157. — *Angelica litoralis* Fries, Fl. Holland. (1817) 51. — *A. archangelica* ssp. *litoralis* Thell. in Hegi, III. Fl. der Mitt.-Eur. V, 2 (1926) 1342. — Ic.: Thell. l. c. Fig. 2507 (fr.).

Perennial; similar to preceding species from which it differs by the ovoid-ellipsoid fruits; dorsal ribs of mericarps thickish, obtuse, pentagonal in cross section; leaflets of involucels subulate, half length of umbel rays; plant larger, to 3 m high, stem 8 cm thick below, umbels ca. 30 cm across. July–August.

Alluvial soil along riverbanks, coastal dunes, shrubs. — European part: Balt. Gen. distr.: Scand., Centr. Eur. Described from Frisian Islands. Type in Lund [Sweden].

3. *A. decurrens* Ldb. Fl. alt. 1 (1829) 316; Fl. Ross. II, 297; Kryl., Fl. Zap. Sib. VIII, 2040. — *A. officinalis* γ. *decurrens* Lallemand in Ind. IX sem. Hort. Petrop. (1843) 61. — *A. decurrens* α. *genuina* Rgl. et Herd. in Bull. Soc. Nat. Mosc. XXXIX, 3 (1866) 77. — *A. norwegica* Rupr. Fl. samojed. cisural. (1845) 37.

31 Perennial; root thick; stem 1.5–3 m high, cylindrical, erect, 3–8 cm thick, hollow, like leaves glabrous; radical leaves long-petioled, large, with petiole 50–200 cm long, broadly triangular, 2- or nearly 3-pinnate; leaflets of first and in part of second order short-petioluled, of third order sessile, decurrent along petiole, especially terminal, which is deeply tripartite into a 3-lobed median lobe, lateral oblong-ovate or ovate-lanceolate, entire or with few lateral segments along outer margin, nearly bifurcate-subulate-dentate, 6–12 cm long, 2.5–6 cm wide. Umbels 8–18 cm across, globular, of 10–50 rays covered with stiff hairs; involucre absent or of 1 leaflet; umbellets globular, 1.5–2.5 cm across; involucels of 8–10 lanceolate, long-acuminate, short-haired leaflets nearly as long as pedicels; calyx-teeth inconspicuous; petals greenish-white, ca. 1.5 mm long, with inward curved tip; fruit elliptic, 5–6 mm long, 3.5–4 mm wide, dorsal ribs filiform, the marginal thickish, with winglike extensions. June–July. (Plate VIII, Figure 9.)

Banks of rivers and bogs, flooded meadows, in damp forests and along their edges. — European part.: Dv. -Pech. (?). (E.); W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang. -Say., Yenisei, Dau. (Baikal area),

Lena-Kol.; Centr. Asia: Balkh. (NE), Dzu.-Tarb., T. Sh. (?). Gen. distr.: Mongolia. Described from Altai. Type in Leningrad.

Note. The isolated specimens seen from the European part of the USSR warrant their inclusion in *A. decurrens* Ldb., but the available material was extremely inadequate, and the northwest limit of *A. decurrens* can be reliably determined only when more collections are made.

4. *A. komarovii* Schischk. sp. nov. in Addenda XVI, 353.

Perennial; stem 80–150 (200) cm high, glabrous, branching, ribbed, hollow; radical leaves with long petioles dilated into sheaths, ternate-pinnate, primary lobes petioluled, leaflets sessile or short-petioluled, upper usually more or less decurrent, nerves glabrous on both sides, ovate, large, 10–20 cm long, 5–9 cm wide; upper leaves biternate, sessile on inflated glabrous or obscurely scabrous sheath, uppermost leaves reduced to inflated sheaths. Main umbel 15–20 cm across, of 25–40 scabrous rays; lateral umbels smaller; involucre absent; umbellets 1.5–2.5 cm across, many-flowered, on glabrous pedicels; involucels of 8–13 linear-lanceolate, nearly entire, scarious, acuminate leaflets with ciliate margin, much shorter than rays; petals entire, with ca. 1 mm long tip greenish at apex; ovary and young fruits scabrous-hairy; stylopodium pulviniform, with undulant margins; styles straight, divergent at first, becoming reflexed; fruit broadly ovoid, 7 mm long, 5 mm wide, with winged dorsal and broader lateral ribs. July–August; Fr. September.

Banks of mountain streams, to 2,700 m. — Centr. Asia: Pam.-Al., T. Sh. Endemic. Described from the vicinity of Iskander-Kul Lake. Type in Leningrad.

5. *A. tschimganica* (Korov.) Schischk. comb. n. — *Archangelica decurrens* var. *tschimganica* Korov. in Sched. ad Herb. Fl. As. Med. fasc. X (1926) 12. — Exs.: H. F. A. M. No. 243.

Perennial; stem 80–150 cm high, glabrous, branching, thinly ribbed; radical leaves with long petioles dilated into sheaths, ternate-pinnate; leaflets sessile or lower petioluled, ovate, 4–8 (12) cm long, 2–5 cm wide, with nerves glabrous on both sides, unequally toothed, teeth triangular, usually with short cusp; cauline leaves similar to radical but much smaller, upper sessile on inflated sheath. Main umbel 8–10 cm across, of 15–30 rays, scabrous or subglabrous above; involucre absent; umbellets many-flowered, 10–15 mm across; involucels of 7–9 lanceolate-linear, nearly entirely scarious, long-acuminate, obscurely ciliate leaflets; pedicels glabrous; petals greenish-whitish, notched with inward curved tip; fruit broadly ovoid, 5–6 mm long, ca. 4.5 mm wide, dorsal ribs winged, lateral wider than dorsal. July–August.

Banks of streams, to 2,000 m. — Centr. Asia: T. Sh. (W.). Endemic. Described from the Chimganka River. Type in Leningrad.

Genus 1041. **COELOPLEURUM*** Ldb.

Ldb. Fl. Ross. II (1844–1846) 361. — *Physolophium* Turcz. in Bull. Soc. Nat. Mosc. XVII (1844) 729. — *Coelopleurum* subgenera *Eucoelopleurum* et *Physolophium* Drude in Engl. Pflanzenfam. III, 7–8 (1898) 212–213

* From the Greek *koiilos* — inflated, *pleura* — rib.

Calyx-teeth inconspicuous; petals elliptic, entire, slightly acuminate, with inward curved tip; fruit in cross section nearly ovoid or slightly compressed dorsally, mericarps with 5 thick, triangular ribs, obtuse, tapering above, with 1 vascular fibrous bundle at base, marginal ribs wider at base, slightly longer than dorsal; canals numerous around seed; carpophore bipartite, free; seeds: 33 in cross section crescent-shaped, albumen concave. Perennials with thick hollow stem and large 2-pinnate leaves with markedly inflated sheaths.

Monotypic genus, similar in habit to the species of *Angelica* and *Archangelica*, distributed in the north of East Asia.

1. *C. gmelinii* (DC.) Ldb. Fl. Ross. II (1844-1846) 361; Kom., Fl. Man'chzh. III, 173; Kom., Fl. Kamch. II, 344. — *C. saxatile* Drude in E. u. P. Pflanzenfam. III, 7-8 (1898) 213. — *Archangelica Gmelinii* DC. Prodr. IV (1830) 170. — *Angelica Gmelinii* Wormsk. ex Fisch. in DC. l. c. (1830) in syn. — *A. maculata* Turcz. in Bull. Soc. Nat. Mosc. (1840) 72. — *A. saxatilis* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 23, nom.; Ldb. Fl. Ross. II, 296. — *Pleurospermum Gmelinii* Bong. Veget. ins. Sitcha (1832) 141. — *Physolophium saxatile* Turcz. in Bull. Soc. Nat. Mosc. XVII (1844) 729; Fr. Schmidt in Maxim. Prim. Fl. Amur. 126.

Perennial; stem cylindrical, 100 cm high, thinly furrowed, often violet, glabrous, pubescent only under inflorescence to middle or end; leaves petioled, broadly triangular, 30-45 cm long, 20-25 cm wide, 2-pinnate, lobes of last order broadly ovate or ovate-lanceolate, acute, 2.5-7 cm long, 2-6.5 cm wide, acutely serrate-incised, glabrous above, slightly scabrous along nerves beneath, terminal leaflets broadly oval, trifid, slightly scabrous along nerves beneath. Umbels 9-12 cm across, of 30-60 acutely scabrous rays; involucre absent; umbellets 1.2-1.5 cm across; leaflets of involucre lanceolate-linear with narrow scarious margin, as long as or slightly longer than umbellets, long-mucronate, very short-ciliate along margin; fruit ovoid, 7 mm long, 4.5 mm wide, dorsal and marginal ribs winged, nearly equal. July-August. (Plate VIII, Figure 10.)

Meadows, riverbanks, subalpine meadows. — Arctic: Chuk., An., E. Siberia; Dau., Lena-Kol.; Far East: Kamch., Ze.-Bu., Okh., Uda, Uss., Sakh. Gen. distr.: Bering. Described from Kamchatka. Type in Geneva.

Genus 1042. **AGASYLLIS*** Spreng.

Spreng. in Ges. Naturf. Fr. Berl. Mag. VI (1812) 259, ex parte; Hoffm. Gen. Umbell. (1816) XVII, XVIII

34 Calyx-teeth inconspicuous; petals notched, with inward curved tip; fruit ovoid, with broad commissure, 3 prominent dorsal ribs, 2 lateral ribs twice as broad; valliculae with 6-10 canals, 4-6 toward commissure; stylopodium short-conical; styles reflexed, longer than stylopodium. Perennial herbs, with large biternate-dissected leaves.

A monotypic genus, distributed in the mountain forests and subalpine belt of the Greater Caucasus.

* Name of the plant in the works of Dioscorides.

1. *A. latifolia* (M. B.) Boiss. Fl. or. II (1872) 980; Grossg., Fl. Kavk. III, 174. — *A. caucasica* Spreng. in Neue Schr. Naturf. Gesellsch. Halle, II, 1 (1813) 22; DC. Prodr. IV, 200; Ldb. Fl. Ross. II, 333. — *Cachrys latifolia* M. B. Fl. taur.-cauc. 1 (1808) 219. — *C. decursiva* Hornem. Hort. Hafn. (1813–1815) 960. — *Siler caasicum* Spreng. Sp. Umbell. (1818) 90; Shmal'g., Fl. I, 414. — *Chymsydia agasylloides* var. *colchica* Alb. in Tr. Tifl. Bot. sada. I (1895) 110. — *Ch. colchica* G. Woron. ex Grossh. Fl. Kavk. III (1932) 174. — *Archangelica latifolia* K. - Pol. in Izv. Mosk. Obshch. estestvoisp. nov. ser. XXIX (1915) 165.

Perennial; root thick, 2.5 cm across; stem 30–100 cm high, 1.5–2 cm across, strongly ribbed, hollow, glabrous, branching, scabrous under umbels; radical leaves long-petioled, often violet, biternate-dissected, pale green above, paler beneath, with stiff short hairs along nerves on both surfaces and along margins, broadly ovate, 40 cm long, 30 cm wide; lobes of last order ovate, dentate, decurrent, 4–5 cm long, 0.5–2 cm wide; cauline leaves similar to radical, their petioles shorter, with large inflated sheaths and 2 large auricles at base. Terminal umbel large, of 30–40 strongly scabrous rays, more or less crowded in fruit; umbels with whorled apical branches of 20–30 smaller rays; involucre absent; involucels of 8–11 narrowly linear unequal leaflets, shorter than scabrous umbellet rays; calyx-teeth inconspicuous; petals narrowly obovate, notched, with acute inward curved tip; filaments whitish; fruit ovoid, 8–10 mm long, 5 mm wide, mericarps with 5 prominent obtuse ribs; stylopodium short-conical; styles reflexed in fruit, longer than stylopodium. June. (Plate III, Figure 1.

Mountain birch and oak forests, subalpine meadows, to 2,400 m. — Caucasus: Cisc., Greater Caucasus, Dag., E. and W. Transc. Endemic. Described from the Caucasus. Type in Leningrad.

Genus 1043. **CHYMSYDIA** * Alb.

37 Alb. in Tr. Tifl. Bot. sada, I (1895) 110; Bull. de l'Herb. Boiss. III (1895) 233

Calyx-teeth inconspicuous; petals white, broadly ovate, notched, with short inward curved lobule; fruit ovoid, dorsally compressed; stylopodium conical; styles reflexed, longer than stylopodium; dorsal ribs winged, approximate, marginal slightly diverging from median plane, slightly wider than dorsal; valliculae with single canals in thin endocarp adjacent to seed, 2–4 canals toward commissure. Perennial herbaceous plants, similar in habit to *Archangelica*, *Xanthogalum* and *Agasyllis*.

Monotypic genus, endemic to the mountain limestones of W. Transc.

1. *C. agasylloides* Alb. in Tr. Tifl. Bot. sada, I (1895) 110 et in Bull. de l'Herb. Boiss. III (1895) 233. — *Selinum agasylloides* Alb. in Bull. de l'Herb. Boiss. II (1894) 252. — Ic.: Alb. in Bull. l. c. p. 255, A et C (fr.).

Perennial; stem (20)40–60 cm high, furrowed, scabrous, sometimes subglabrous, simple or slightly branching, with obliquely antrorse branches;

* Local name of plant.



PLATE III. 1—*Agasyllis latifolia* (M. B.) Boiss.; 2—*Xanthogalum purpurascens* Lallem.

leaves coriaceous, lower long-petioled, tripartite; terminal lobes long-petioluled, biternate-dissected, lateral on shorter petioles, pinnatisect into oblong or ovate-lanceolate, long-decurrent, unequally bidentate lobules, cuneate at base, scabrous along nerves and along margin; upper leaves smaller, bi- to triternate, with narrower lobules; petioles of upper leaves dilated into broad, membranous, purple-veined sheaths. Umbels of 6–10 scabrous rays thickened in fruit; involucre and involucels absent; young fruit scabrous, ovoid, dorsally compressed, elliptic in cross section, covered with small papillae; dorsal ribs broadly winged, lateral slightly wider. July–August. (Plate IV, Figure 2.)

Stony slopes in alpine belt, alpine meadows, 2,200–2,600 m. — Caucasus: W. Transc. (mountains of Abkhazia). Endemic. Described from calcareous mountains of Abkhazia (Chipshirg, Kutysh, Kopeimye). Type in Geneva, cotype in Leningrad.

Note. In habit, this species is very close to *Agasyllis latifolia* (M. B.) Boiss., from which it differs by the winged, dorsal ribs and also by having fewer umbel rays.

38 Genus 1044. **XANTHO GALUM** * Lalle m.

Lalle m. in Ind. VIII sem. Hort. Petrop. (1841) 23. — *Tommasinia* Boiss. in Ann. Sc. Nat. Botan. (1844) 302, non Bertol.

Flowers bisexual or polygamous. Calyx-teeth distinct. Petals sub-rounded, with inward curved tip, yellowish-greenish. Fruit ovoid, dorsally compressed, mericarps with 3 winged dorsal ribs, lateral wings broader, undulant; valleculae with 1 canal, 2 toward commissure. Perennials with high stem, with whorled branches and 2–3-pinnate leaves, leaflets long, decurrent along petioles.

Three species in Asia Minor, to the Caucasus and Iran.

1. Sheath covered outside, especially along nerves, with short hairs 3. *X. tatianae* (Bordz.) Schischk.
- + Sheaths glabrous 2.
2. Leaves dense, subcoriaceous, with large oblong-lanceolate terminal lobes, 8–15 cm long, 3–8 cm wide; pedicels as long as fruit, arcuately curved after flowering. 2. *X. sachokianum* Karjag.
- + Leaves not coriaceous, terminal lobes 4–8 cm long, 2–4 cm wide; pedicels oblique or horizontal after flowering, twice as long as fruits 1. *X. purpurascens* Lalle m.

1. *X. purpurascens* Lalle m. in Ind. VIII sem. Horti Petrop. (1842) 23; Ldb. Fl. Ross. II, 316. — *Angelica dura* C. Koch in Linnaea, XVI (1842) 357; Ldb. Fl. Ross. II, 279. — *A. purpurascens* Gilli in Beih. Bot. Centralbl. LIX B (1939) 341. — *Tommasinia szovitsii* Boiss. in Ann. Sc. Nat. III sér. Bot. (1844) 302. — *T. purpurascens* Boiss. Fl. or. II (1872) 979. — *Imperatoria decursiva* C. A. M. ex Glehn in Ind. sem. Hort. Petrop. (1868) 87.

* From the Greek *xanthos* — yellow, *gala* — milk.

Perennial; stem 0.50–4.20 m high, with whorled branches, 7–10 mm thick in lower part, usually violet, glabrous, scabrous only under inflorescence, thinly furrowed, hollow; lower leaves 2- or 3-pinnatisect, their long petioles dilated into oblong scarious sheath with margins; blade broadly ovate, (20)30–40 cm long, 20–30 cm wide, primary lobes petioluled, ternate, lateral sessile, decurrent, ovate, outer much larger than inner, 39 unequally toothed, sometimes tripartite, nerves, especially main nerve, acutely scabrous above, glabrous below, lobes 4–8 cm long, 2.4 cm wide. Umbels of 15–30 very unequal glabrous or very short-scabrous, furrowed rays; involucre absent or of 1 leaflet; involucels of 3–7 narrowly linear or nearly setiform leaflets shorter than scabrous rays; calyx 5-toothed; petals yellowish-greenish or violet, subrounded, with inward curved tip; fruit markedly compressed dorsally, subcylindrical or broadly ovoid, 8–12 mm long, 7–10 mm wide, 3 dorsal ribs winged, cork-like, lateral developed as few undulant wings, as wide as body of fruit (ca. 3.5 mm); canals solitary in valliculae, 2 toward commissure; stylopodium short-conical; styles curved outward, slightly longer than stylopodium. July. (Plate III, Figure 2; Plate XXIII, Figure 6.)

Subalpine meadows, edges of mountain forests, 2,000–2,400 m. – Caucasus: Greater Caucasus, W., E. and S. Transc. Gen. distr.: As. -Min., Arm. -Kurd., Iran. Described from W. Georgia (Tsikhisdzhvari). Type in Leningrad.

2. *X. sachokianum* Karjag. in Dokl. Akad. Nauk Azerbaidzhanskoi SSR, Baku, II, No. 10 (1946) 425.

Perennial; stem 40–100 cm high, strongly ribbed, glabrous, scabrous only under umbels; radical leaves 2- or simple-pinnate, their petioles nearly as long as blade, gradually dilated into oblong or broadly ovate sheath, blade broadly ovate, to 20 cm long and nearly as wide; lower primary lobes very short-petioluled, deeply 2-lobuled, unequally and acutely toothed, 8–15 cm long, 3–8 cm wide, acutely scabrous along nerves above; in upper cauline leaves blade reduced, sessile on inflated sheath or obsolete. Umbels of 20–35 extremely unequal rays, scabrous above, sometimes subglabrous; involucre absent or of 1–3 caducous leaflets; umbellets 0.5–1 cm across, 10–20-flowered; involucels of 3–5 narrowly linear leaflets, nearly as long as umbellets; petals greenish-yellowish, rounded, with inward curved tip; fruit broadly obovoid, 7–8 mm long, as wide in upper part; stylopodium pulviniform, with pubescent edge; styles divergent, shorter than stylopodium. July–August.

Banks of streams and creeks, mountain forests and subalpine belt, to 1,200–1,800 m. – Caucasus: E. Transc. Endemic. Described from Niel-Dag Mountain. Type in Leningrad.

3. *X. tatianae* (Bordz.) Schischk. comb. nov. – *Angelica Tatianae* Bordz. in Zhurn. Inst. bot. VUAN, No. 3 (1934) 73. – Ic.: Bordz. l. c. fig. 3.

40 Perennial; stem 100–120 cm high, with whorled branches above, hollow, to 1 cm wide, glabrous, scabrous-hairy only under umbels; radical leaves on thick short cylindrical petioles, shorter than broadly triangular, ternately pinnate, ca. 30 cm long and almost equally wide blade; primary lobes broadly

ovate, 20–25 cm long, 10–15 cm wide, deeply pinnatifid into ovate acute lobules 6–8 cm long, 3–5 cm wide, short-haired beneath and along margins, unequally acutely toothed, slightly scabrous along nerves above, cauline leaves sessile on strongly inflated sheath hairy outside along nerves; blade ternately parted with pinnate lobes of the second order, terminal lobes oblong-lanceolate, acuminate, 10–12 cm long, 2–3.5 cm wide; reduced in upper leaves. Umbels 10–15 cm across, of 25–35 unequal rays, scabrous above, spreading at flowering, more or less crowded in fruit; involucre absent; umbellets 10–15 mm across; involucels of 3–5 subulate or filiform, caducous leaflets; petals yellowish-greenish, acute or slightly notched, ca. 1 mm long; stylopodium short-conical, with undulant-notched edge; styles reflexed, slightly longer than stylopodium; fruit (young) broadly ovoid, 6 mm long, 5 mm wide; dorsal ribs narrowly, marginal broadly winged. Fl. July, Fr. August.

Mountain birch forests, tall grass meadows. — Caucasus: Cisc., W. Transc. (Abkhazia, Megrelia). Endemic. Described from Caucasus (Greater Pambak Mountain). Type in Kiev.

Genus 1045. **LEVISTICUM** * Hill.

Hill. Brit. Herb. (1756) 410. — *Hipposelinum* Britt. et Rose in Britt. et Brown, III. Fl. ed. 2, II (1913) 634

Calyx-teeth inconspicuous; petals pale yellow, elliptic, with inward curved tip; fruit ovoid, dorsally compressed; mericarps with thickish, dorsal ribs with narrow, lateral with more than twice as wide wings, canals solitary in valliculae, 2 (rarely 4) toward commissure; stylopodium conical, styles twice as long. Perennial, high, subglabrous herbs, with erect stem and large 2–3-pinnatisect leaves.

Three species in W. Europe, Asia Minor (?) and Iran.

- 41 1. *L. officinale* Koch, Umbell. (1824) 101; Ldb. Fl. Ross. II, 292; Shmal'g., Fl. I, 403; Grossg., Fl. Kavk. III, 174. — *L. paludapifolium* Aschers. Fl. Brand. (1864) 250. — *L. Levisticum* Karst. Deutsche Fl. Pharm. medic. Bot. (1882) 844. — *Ligusticum Levisticum* L. Sp. pl. (1753) 250. — ? *Angelica paludapifolia* Lam. Fl. Franc. III (1778) 451. — *A. Levisticum* All. Fl. Pedem. II (1772) 10. — *Selinum Levisticum* E. H. L. Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 116. — *Hipposelinum Levisticum* Britt. et Rose in Britt. et Brown. III. Fl. ed. 2, II (1913) 635. — Ic.: Syreishch., III. Fl. Mosk. gub. II (1907) 411; Kom., Sbor. sushka i razved. lekarstv. rast. izd. 3, Table 54 (1917).

Perennial; rhizome thick, brownish; stem 1–2 m high, its base covered with many squamiform remnants of leaves, erect, hollow, glabrous, furrowed, branching above; leaves dark green, shiny, paler beneath, broadly triangular, 2–3-pinnatisect, lower large (70 × 65 cm), long-petioled; cauline leaves smaller, less strongly dissected, their petioles shorter, uppermost leaves

* Latin version of the Greek libystikon or ligustikon — name of the plant in Dioscorides.

sessile on dilated sheaths, biternate-or ternate-partite, sometimes entire; lobes of last order large, 10–11 cm long, 6–7 cm wide, obovate, entire, cuneate at base, toward apex largely incised-dentate, teeth terminating in cartilaginous denticles, upper leaves nearly entire, with smooth margins. Umbels ca. 12 cm across, of 12–20 rays, scabrous above, slightly broadening toward apex, leaves of involucre and involucels numerous, recurved, lanceolate, with white-membranous finely ciliate margins, often also scabrous above; leaflets of involucels slightly connate; calyx-teeth inconspicuous; petals whitish-yellowish, inconspicuous, ca. 1 mm long and as wide, elliptic, very short-clawed, slightly notched with inward curved tip; stylopodium at flowering low-conical, yellowish, with very short styles; fruit ellipsoid, dorsally compressed, 5–7 mm long, 3–4 mm wide, often incised at base, when ripe yellowish-brown, smooth, the 3 dorsal ribs approximate, narrowly triangular in cross section, with nearly winglike extensions, half width of thickened marginal ribs; styles 1.5–2 mm long in fruit, reflexed, slightly capitate; carpophore 2-cleft to base; albumen flat or obliquely notched. August.

Grown in gardens and kitchen gardens, sometimes escaped, especially in southern part of USSR. — European part: Balt., U. Dnp., M. Dnp., V. -Don, V. -Kama, L. Don, Bl., Bes., U. Dns., Crim.; Caucasus: everywhere. Gen. distr.: cultivated and locally escaped nearly all over Europe and N. America. Described from W. Europe. Type was in Berlin.

Economic importance. In earlier times the root was officinal as "*Radix Levistici*." It contains starch, sugar, water, resin, angelic acid; when fresh it yields 0.3–0.5%, when dried 0.6–1% essential oil which contains d-terpineol, related to cineole, and one terpene. Occasionally eaten as a vegetable or used as a flavoring.

Genus 1046. **GLEHNIA** * F. Schmidt

Fr. Schmidt in *Miq. Ann. Mus. Ludg.-Bat. III* (1867) 61. — *Phellopterus* Benth. in Benth. et Hook. *Gen. Pl.* I (1867) 905, non Nwt. (1840)

Calyx with 5 ovate acute teeth; petals white or slightly violet, ovate-lanceolate, notched, with long inward curved lobule; stylopodium short-conical, with short erect style; fruit broadly ovoid, covered with soft scarious hairs; mericarps with 5 thickish winged ribs surrounded by inconspicuous canals adjacent to seed; carpophore very thin, bipartite; albumen slightly notched, with slightly revolute margins. Perennial herbs, tomentose below, with 2-pinnate leaves.

Monotypic genus distributed along the coastal sands of E. Asia.

1. *G. litoralis* Fr. Schmidt in *Ann. Mus. Ludg.-Batav. III* (1867) 61. — *Phellopterus littoralis* Benth. in Benth. et Hook. *Gener. Plant.* I (1867) 905; Kom., *Fl. Man'chzh. III*, 174.

Perennial; root long, rather thick, 0.5–1.5 cm across, fleshy; stems 10–40 cm high, thickish, simple or slightly branching, densely covered with curly, nearly tomentose rufous hairs, with 1–3 leaves, sometimes leafless; radical leaves few, bipinnatisect, often lower primary lobes strongly developed

* Named after Petr Petrovich Glen (1837–1876), a field botanist active in Amur and Sakhalin, and at the Petersburg Botanical Garden.



PLATE IV. 1 — *Glehnia littoralis* Fr. Schmidt.; 2 — *Chymosydia agasyllloides* Alb.

45 sometimes appearing ternate; leaves with long, tomentose petioles dilated into sheaths, as long as blade, blade usually broadly triangular-ovate, 5–12 cm long, as wide in lower part; primary lobes pinnatipartite, 1–2 pairs of lobules of second order with 1 large tooth in lower part, segments of last order ovate, obtuse (crenate-serrate) with triangular cartilaginous teeth; leaves glabrous above, tomentose beneath; base of cauline leaves dilated to sheath, sometimes blade obsolete. Umbels 4–10 cm across, of 10–16 unequal tomentose rays; involucre absent; involucels of 9–13 linear-lanceolate, densely pubescent leaflets as long as or longer than pedicels; anthers dark violet; fruit broadly ovoid, 6 mm long, 4 mm wide, its winged ribs covered with soft jointed hairs. Fl. June–July, Fr. August. (Plate IV, Figure 1.)

Coastal sands. — Far East: Sakh., Uda, Uss. Gen. distr.: China, Japan. Described from E. Asia. Type in Leningrad.

Genus 1047. **PALIMBIA** * Bess.

Bess. Enum. pl. Volhyn. (1822) 55, 94; DC. Prodr. IV, 175

Calyx-teeth conspicuous; petals whitish, white or light straw-colored, oblong, slightly notched; fruit oblong-linear, slightly compressed dorsally, subcircular in cross section, with filiform dorsal and narrowly winged lateral ribs; canals 3–4 in valliculae, 6 toward commissure. Perennials, with finely dissected leaves and pungent odor.

One species from the Moldavian SSR to Irtysh.

1. *P. rediviva* (Pall.) Thell. in Hegi, III. Fl. Mitt.-Eur. V, 2 (1926) 1364; E. Korov. in Monogr. *Ferula* (1947) 81. — *P. salsa* Bess. Enum. pl. Volhyn. (1820) 55, 94; DC. Prodr. IV (1830) 175; Grossg., Fl. Kavk. III, 175. — *P. turgica* Lipsky ex Woron. in Fl. Yugo-Vost. Evrop. ch. SSSR, Vol. V. (1931) 818, fig. 535. — *Peucedanum redivivum* Pall. in Act. Petrop. II (1779) 252. — *P. salcum* Steud. Nomencl. ed. 2, II (1841) 311. — *P. Palimbria* Baill. Histoire des Plantes, VII (1880) 100. — *Sison salsum* L. fil. Suppl. (1781) 181. — *Sium nudicaule* Lam. Encycl. meth. I (1783) 407. — *Agasyllis salsa* Spreng. Umbell. Prodr. (1813) 22. — *Siler salsum* Spreng. Spec. Umbellif. (1818) 90. — *Ferula salsa* Ldb. Fl. alt. I (1829) 344 in nota; Ldb. Fl. Ross. II, 304; Shmal'g., Fl. I, 407. — *F. rediviva* Schischk. in Kryl., Fl. Zap. Sib. VIII (1935) 1996. — *Meum nudicaule* Trev. Symbol. phytol. I (1831) 31. — *Foeniculum salsum* Calest. in Webbia, 1 (1905) 205. — *Seseli salsum* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 183, in nota. — Ic.: Pall. l. c. (1779) tab. 8.

46 Perennial; stem erect, 50–100 cm high, 1–3 cm thick, glabrous, with thin, declinate branches in upper half; radical leaves long-petioled, oblong, 8–20 cm long, 3–10 cm wide, subglabrous or scabrous when young, covered with short stiff hairs, tripinnatisect into sessile lobes in opposite, whorled bundles or alternate, lobules of last order linear, 2–4 mm long, ca. 0.3 mm wide,

* From the Greek palimbios — back to life; palin — back, bios — life (redivivus).

(47)



PLATE V. 1—*Saposhnikovia divaricata* (Turcz.) Schischk.; 2—*Phlojodicarpus sibiricus* (Steph.) K.-Pol. (fruit in schematic cross section); 3—*Johrenia paucijuga* (DC.) Bornm. (fruit in schematic cross section).

tapering to short bristle; cauline leaves reduced, to 1–2 cm long sheaths, rarely with reduced blades. Branches of inflorescence alternate; umbels many, at end of branches, forming broad paniculate inflorescence, of 3–12(20) unequal, subfiliform, glabrous rays; median umbels fertile, lateral sterile; involucre and involucels of 3–5 linear or setiform leaflets, much shorter than rays of umbels and umbellets; umbellets ca. 1 cm across, 5–10-flowered; fruit oblong, 5–6 mm long, 2 mm wide; stylopodium short-conical; styles reflexed, somewhat longer than stylopodium. June–July; Fr. August. (Plate VI, Figure 1.)

Steppe and semisteppe zone, feather-grass, soft turfy steppes, solonchaks, dry and calcareous slopes. — European part: Transv., L. V., Bl., Bes., Crim. (Kerch Peninsula and Koktebel'); Caucasus: Cisc.; W. Siberia: U. Tob, Irt.; Centr. Asia: Ar. -Casp., Balkh. (N.). Endemic. Described from the lower reaches of the Volga. Type in London.

Genus 1048. **JOHRENIA*** DC.

DC. Mem. Omb. (1829) 54 et in DC. Prodr. IV (1830) 196

Calyx-teeth inconspicuous; petals yellow, slightly notched; fruit broadly ovoid, dorsally compressed, with spongy pericarp and inflated edge; mericarp with 5 thickish spongy ribs; stylopodium conical; styles reflexed, longer than stylopodium; canals large, solitary in all ribs, absent toward commissure; albumen deeply concave toward commissure. Perennials, with 2–3-pinnate leaves.

49 Up to 15 species, in S. Transcaucasia, Asia Minor and Iran.

1. *J. paucijuga* (DC.) Bornm. in Russk. Bot. Zhurn. 1–2 (1910) 9; Grossg. in Vestn. Tifl. Bot. sada (1927) 20; Fl. Kavk. III, 175. — *J. Candollei* Boiss. in Ann. Sc. Nat. (1844) 306; Fl. or II, 1012. — *J. persica* Boiss. l. c. (1844) 306. — *Ferula paucijuga* DC. Prodr. IV (1830) 171. — *Seseli leucocoleum* Wettst. et Stapf in Denkschr. Ak. Wiss. Bd. LI, math. -nat. Klasse, Wien (1886) 318. — *Statice* (sphalm.) *leucocoleum* Index Kew. Suppl. I, 409.

Perennial; root rather thick, multicapital, its neck densely covered with brown fibrous remnants of petioles; entire plant glabrous; stem 25–35 cm high, angular-furrowed, branching nearly from base, the obliquely antrorse branches often overtopping main stem; radical leaves oblong, their petioles shorter than or nearly as long as blade, 2- or nearly 3-pinnatisect, 8–10 cm long, 1.5–2.5 cm wide; primary lobes short-petioluled, ovate-oblong, pinnatisect into linear obtuse, 2–5 mm long, 0.3–0.5 mm wide lobules; cauline leaves similar to radical, smaller. Umbels 2–8 cm across, of 7–11 smooth, very unequal rays; involucre absent; umbellets 6–8 mm across, many-flowered; involucels of 3–7 lanceolate, acute leaflets with narrow membranous margins; calyx-teeth inconspicuous; petals yellow, ca. 1 mm long, hardly notched; fruit broadly ovoid, 5 mm long, 4 mm wide, with inflated margin and 5 thick spongy ribs; stylopodium conical; styles reflexed, 1½ times length of stylopodium. May–June. (Plate V, Figure 3.)

* After Jöhren Martin Daniel, professor at Frankfurt, author of *Vademecum botanicum*, and pioneer in the use of dichotomous keys for naming plants (died 1718).

Stony slopes. — Caucasus: S. Trans. Gen. distr.: Iran. Described from the Shovits collection from Iran. Type in Geneva, cotype in Lenin-grad (?).

Genus 1049. **PHLOJODICARPUS*** Turcz.

Turcz. ex Bess. in Flora, XVIII (1834) 1 Beibl. 14

Calyx-teeth long, lanceolate or setiform; petals white or pale violet, broadly ovate, abruptly tapering to short claw, notched, with inward curved lobule; fruit broadly ovoid, dorsally compressed; stylopodium short-conical; styles straight at first, becoming recurved; mericarps with 3 prominent, obtuse, dentate-suberose dorsal and 2 winglike expanded, slightly inflated marginal ribs with winglike expansions. Perennial herbaceous plants, with 2- or 3-pinnate leaves, many-rayed umbels, involucre and involucels.

Two species in W. and E. Siberia.

1. Umbel rays, leaflets of involucre and involucels densely pubescent 2. *P. villosus* Turcz.
- + Umbel rays scabrous only above, leaflets of involucre and involucels glabrous 1. *P. sibiricus* (Steph.) K. -Pol.

1. *P. sibiricus* (Steph.) K. -Pol. In Spisok rast. gerb. russk. flory VIII (1922) 117. — *Ph. nudiusculus* Turcz. ex Bess. in Flora, XVII, 1 (1834) Beibl. p. 14. — *Ph. dahuricus* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 93, nom. nud.; Ldb. Fl. Ross. II, 331. — *Cachrys sibirica* Steph. ex Fisch. Cat. sem. Horti Vratisl. (1823) nom. nud.; Spreng. Syst. Veg. I (1825) 892 descr.; Trevir. in Act. Acad. Nat. curios. XIII (1826) 168. — *Seseli vaginatum* Ldb. Fl. alt. I (1829) 336; Ldb. Fl. Ross. II, 277. — *Libanotis cachroides* DC. Prodr. IV (1830) 151; Turcz. Fl. baic. -dahur. 1, 485. — *L. nudiuscula* Turcz. in Sched. Herb. Petrop. — *Johrenia nudiuscula* Palib. in Mater. dlya Fl. Zabaik. I (1902) 9. — *Peucedanum nudiusculum* K. -Pol. in Fl. Az. Ross. XV (1920) 24. — Ic.: Ldb. Ic. pl. Fl. Ross. II, tab. 171. — Exs.: G. R. F. No. 2630.

Perennial; root thick, sometimes multicapital, its neck covered with brown remnants of petioles; stems single or few, 15–70 cm high, glabrous, short-haired only under umbel, ribbed, erect, simple or branching, with few obliquely antrorse branches; radical leaves usually many, tripinnatisect, green glaucescent, glabrous, with oblong-ovate or ovate, 6–30 cm long, 2–8 cm wide blade with linear-lanceolate acute or acuminate 2–20 mm long, 0.5–1.5(2) mm wide lobes of the last order; cauline leaves 2–3 (sometimes absent), smaller, with strongly expanded, long, sometimes violet sheaths. Umbels of 8–23 nearly equal rays, scabrous especially above; leaflets of involucre 5–7, caducous; leaflets of involucels 9–12, similar, white-hyaline, linear-lanceolate, acuminate, glabrous, often retrorse; calyx-teeth glabrous; petals 1.8 mm long, white; fruit broadly ovoid, 5–8 mm long, 3 mm wide, glabrous or covered with short stiff curly hairs. June–July. (Plate V, Figure 2; Plate VII, Figure 2.)

* From the Greek *phlōidao* — bulge, *carpos* — fruit.



PLATE VI. 1 — *Palimbia rediviva* (Pall.) Thell.; 2 — *Schumannia karelinii* (Bge.) Korov.

53 Stony and exposed slopes, sand dunes, steppes, calcareous rocks, rarely in mountain pine, larch-spruce and birch forests. — E. Siberia: Ang.-Say. (west to regional boundary), Dau., Lena-Kol. (?) (upper reaches of the Indigirka); Far East.: Okh. Described from Siberia. Type in Leningrad.

Note. *P. sibiricus* is beyond doubt the best validated name for this species. Although Sprengel does not mention the exact locality of its type (he merely writes: uncertain - Siberia), it is nevertheless obvious from Treviranus' detailed description (l. c.) that the plant cultivated in the Bratislava (?) garden belongs to this species, as the second species, *P. villosus* Turcz., has the characteristic pubescent rays, involucre and involucels, which are not mentioned by Treviranus.

2. *P. villosus* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 93, nom. nud.; Ldb. Fl. Ross. II, 331. — *Phlojodicarpus microcarpus* Ldb. Fl. Ross. II (1844–1846) 331. — *Libanotis villosa* Turcz. ex Fisch. et Mey. Ind. I sem. Hort. Petrop. I (1835) 31; Turcz. Fl. baic.-dah. I, 485. — *Johrenia villosa* Benth. in Benth. et Hook. Gen. Pl. I (1867) 925; Kudo, Rep. Veg. N. Saghal. (1929) 91. — *Stenocoelium villosum* K.-Pol. in Bull. Soc. Nat. Mosc. XXIX (1915) 132; Fl. Az. Ross. XV (1920) 21; Kryl., Fl. Zap. Sib. VIII, 2025.

54 Perennial; root rather long, 1–1.5 cm thick, neck densely covered with dark brown fibrous remnants of leaves; stem 10–40 cm high, to 7 mm thick in lower part, glabrous, densely covered below with remnants of petioles; leaves glaucescent-green, glabrous, their blade oblong-ovate or ovate, 6–20 cm long, 2–6 cm wide, 2- or 3-pinnate, the lanceolate, acuminate lobes of last order 2–5 mm long, 0.5–1 mm wide; cauline leaves 2–3; uppermost leaves small, with strongly expanded, inflated, amplexicaul sheaths with membranous margins; radical leaves long-petioled. Umbels 3–7 cm across, of 8–30 white-villous rays, covered with long thin curly hairs; leaflets of general involucre 5–11, lanceolate-linear, long-acuminate, broadening at base, densely villous, membranous or with membranous margins as long as or half length of rays; leaflets of involucels 5–11, similar to those of involucre, usually longer than umbel rays; calyx-teeth lanceolate, acute, pubescent, nearly as long as white or pale violet, broadly obovate, ca. 2 mm long and as wide petals; fruit ovoid, 5–9 mm long, 3–5 mm wide, soft-haired, sometimes smaller, 4–5 mm long, 3.5–4 mm wide (var. *microcarpus* (Ldb.) K.-Pol.). (Plate VII, Figure 1.)

Stony and moss-lichen tundra, dry beds in alpine zone. — Arctic: N. Ural, Arc. Sib., Chuk., An.; W. Siberia: eastern slope of N. Ural Alt. (Kuznetsk Ala-Tau, Naryn Range); E. Siberia: Ang.-Say., Dau., Lena-Kol. (Lower Tugunska and Taimyr Range). Gen. distr.: Mongolia. Described from Baikal. Type in Leningrad.

Genus 1050. **SAPOSHNIKOVIA** * Schischk.

Schischk. in Addenda XVI, 359.

Calyx-teeth short-triangular; petals white, glabrous, broadly oval, obtuse, not notched; ovary densely covered with transverse white

* After Professor V. V. Sapozhnikov (1861–1924), from Tomsk University, an explorer of Russian and Mongolian Altai, Dzungarian Ala-Tau, Tien Shan and Turkish Armenia.

(55)



PLATE VII. 1 — *Phlojodicarpus villosus* Turcz.; 2 — *Ph. sibiricus* (Steph.) K.-Pol.

excrecences becoming obliterated in fruit; fruit ovoid, slightly compressed dorsally, mericarps with acute prominent dorsal ribs, each with 1 large canal, vallecule broad, with 1 canal, 2 canals toward commissure; albumen flat; stylopodium conical; styles straight at first, becoming recurved, as long as stylopodium. Perennial herbs, with stem strongly branching from base and 2-3-pinnatisect leaves.

Monotype genus endemic to E. Siberia, the Far East, Mongolia, Manchuria and Korea.

1. *S. divaricata* (Turcz.) Schischk. comb. nov. — *Stenocoelium divaricatum* Turcz. in Flora XVII, Beibl. (1834) 14, nom. et in Bull. Soc. Nat. Mosc. XI (1838) 93, nomen nud.; Ldb. Fl. Ross. II (1844) 332; Turcz. Fl. baic.-dahur. 1 (1844) 493; Maxim. Prim. Fl. Amur. (1859) 128. — *Siler divaricatum* Benth. et Hook. Genera plant. 1 (1867) 909. — *Trinia dahurica* Turcz. ex Bess. in Flora, XVII, 1 (1834) Beibl. p. 14, nom. nud. — *Johrenia seseloides* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 133; Fl. Az. Ross. 15 (1920) 26. — *Laser divaricatum* Thell. in Le Monde d. Plant. XXVI (1925) 4. — Ic.: K.-Pol. in Fl. Az. Ross. 15, table 4; Kom., Opred. rast. Dal'nevost. kr. II, table 253.

57 Perennial; root 1.5–2 cm thick, vertical, its neck densely covered with brown leaf remnants; stem single, 30–80 cm high, branching from base with obliquely ascending branches nearly as long as or longer than main stem, ribbed, flexuose, stem and leaves glabrous; radical leaves numerous, their short flattened petioles abruptly dilated into sheaths, blade oblong, 6–20 cm long, 2–4 cm wide, 2- or nearly 3-pinnatipartite; primary lobes oblong or ovate, petioluled, lower secondary lobes also petioluled (upper sessile), pinnatisect into acute narrow ovate sessile lobules; cauline leaves similar to radical but smaller, upper leaves sessile on expanded sheath, with undeveloped blade or blade obsolete. Umbels 4–6 cm across, numerous, forming corymbiform panicle of 6–7 glabrous, angular, unequal rays; involucre absent; umbellets 4–10-flowered; calyx-teeth conspicuous, short-triangular; petals white, glabrous, broadly oval, obtuse, not notched; ribs of ovary covered with transverse white excrescences; stylopodium conical; styles straight at first, later recurved, nearly as long as stylopodium; ripe fruit glabrous, ovoid, 5–6 mm long, 3–3.5 mm wide, with prominent acute ribs. June–July. (Plate V, Figure 1.)

Pebbly steppe slopes, shrubby thickets, birch forests, rarely as a weed. — E. Siberia: Dau.; Far East: Ze.-Bu., Uss. Gen. distr.: Mongolia, Manchuria, China, Korea. Described from Transbaikalia. Type in Leningrad.

Genus 1051. **CYMBOCARPUM** * DC.

DC. Prodr. IV (1830) 186 in nota ad *Anethum cymbocarpum* DC.

Calyx-teeth inconspicuous; petals obcordate, with inward curved lobe, white or pink; fruit compressed dorsally, with thin tapering or slightly inflated margin; ribs thin, filiform, often inconspicuous, lateral close to margin

* From the Greek *kymbe* (Latin *cymba*) — boat, *karpon* — fruit, referring to the shape of the mericarps.

of fruit; stylopodium short-conical; canals ultimately obliterated. Annual or biennial herbs, with 2- or 3-pinnate leaves divided into linear lobules; involucre and involucels of 5-7 linear herbaceous leaflets.

Four species in Transcaucasia and the northern parts of Turkey and Iran.

58

1. Fruit finely scabrous-hairy; umbels of 6-15 rays 1. *C. anethoides* DC.
- + Fruit glabrous 2.
2. Peripheral petals elongated, 2-2.5 mm long, umbel of 13-21 rays 3. *C. wiedemannii* Boiss.
- + Peripheral petals not elongated, 1-1.5 mm long, umbel of 7-11 rays 2. *C. erythraeum* (DC.) Boiss.

1. *C. anethoides* DC. Prodr. IV (1830) 186; Ldb. Fl. Ross. II, 365; Boiss. Fl. or. II, 1028; Grossg., Fl. Kavk. III, 176. — *Anethum cymbocarpum* DC. l. c. (1830). — Exs.: Herb. Fl. Cauc. No. 93; Pl. orient. No. 238.

Annual; root thin, to 2 mm (sic!) across in upper part, straight or curved; stem 5-35 cm high, branching from base, stem and leaves glabrous; leaves ovate, lower with petioles longer than blade, blade 3 cm long, 1.5 cm wide, tripinnatisect into narrow linear acute, 2-7 mm long, 0.3-0.5 mm wide lobules; upper leaves smaller, sessile on short sheath with broad white margin. Umbels 2-4 cm across, of 6-13 unequal glabrous rays; involucre of 1-6 narrow linear acute leaflets; umbellets 6-10 mm across; involucels of 1-3 nearly equal, linear leaflets, $\frac{1}{3}$ to $\frac{1}{2}$ length of rays; petals white, deeply notched, 1.5 mm long, with inward curved tip; fruit broadly ovoid, 3 mm long, 2 mm wide, finely scabrous, with narrow white margin, dorsal ribs filiform. June-July.

Dry and stony slopes, wormwood steppes. — Caucasus: E. and S. Transc., Tal. Gen. distr.: Iran. Described from Iran. Type in Geneva.

2. *C. erythraeum* (DC.) Boiss. Fl. or. II (1872) 1028; Grossg., Fl. Kavk. III, 176. — *C. anethoides* C. A. M. Verzeichn. Pfl. Kauk. (1831) 132, non DC. — *Anethum erythraeum* DC. Prodr. IV (1830) 186.

- 61 Annual or biennial; root long, vertical; stems 10-30 cm high, ascending or erect, sometimes spreading, branching from base, rarely nearly simple, glabrous; radical leaves withering early, their long petioles abruptly passing into expanded sheath, blade broadly oval, 1-1.5 cm long, nearly as wide, bipinnatisect into linear acute, 3-8 mm long, ca. 0.5 mm wide terminal lobules; cauline leaves similar to radical, median and upper leaves sessile on expanded sheath with broad membranous margin. Umbels 3-7 cm across, of 9-11 unequal glabrous rays; involucre and involucels of 5 linear, acute recurved leaflets without membranous margin; petals white or pink, ca. 1 mm long; fruit broadly ovoid, 3-3.5 mm long, 2.5 mm wide, glabrous; stylopodium short-conical; styles reflexed, longer than stylopodium; ribs filiform, marginal slightly broadened. July-August.

Gravels, stony taluses and slopes, shrubs, to 3,000 m. — Caucasus: S. Transc. (Lake Sevan), Tal. Gen. distr.: Arm.-Kurd. (Oltu, Artvin), Iran (N.). Described from N. Iran. Type in Geneva, cotype in Leningrad.

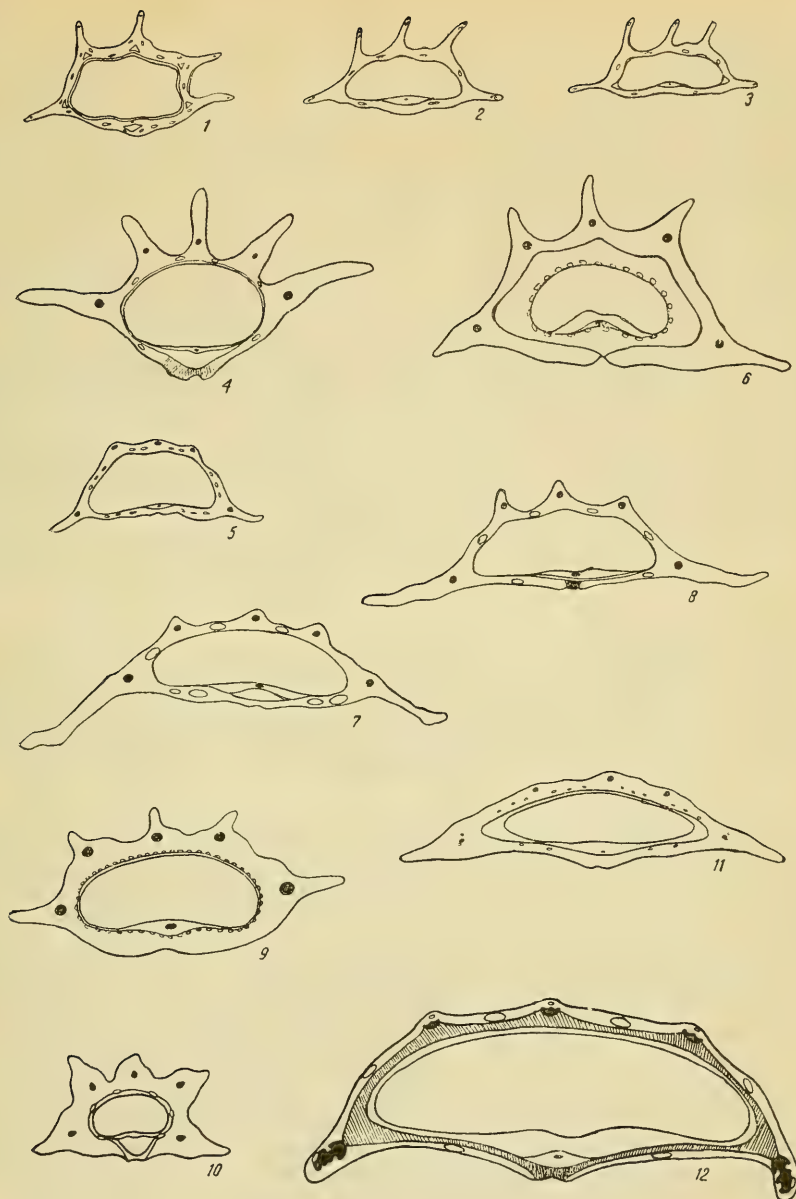


PLATE VIII. Schematic cross sections of mericarps: 1 — *Conioselinum kamtschaticum* Rupr.; 2 — *C. vaginatum* (Spreng.) Thell.; 3 — *C. latifolium* Rupr.; 4 — *C. victoris* Schischk.; 5 — *Angelica decursiva* (Miq.) Franch.; 6 — *A. brevicaulis* (Rupr.) B. Fedtsch.; 7 — *A. amurensis* Schischk.; 8 — *A. sachalinensis* Maxim.; 9 — *Archangelica decurrens* Ldb.; 10 — *Coelopleurum gmelinii* (DC.) Ldb.; 11 — *Peucedanum hystrix* Bge.; 12 — *P. renardii* Rgl. et Schmalh.

3. *C. wiedemannii* Boiss. Fl. or. II (1872) 1028; Grossg., Fl. Kavk. III, 176.

Annual or biennial; entire plant glabrous; root long, vertical, fusiform, to 0.8 cm thick; stem 20–40 cm high, from base with obliquely ascending branches nearly as long as main stem; leaves ovate, lower with petioles as long as blade, blade ca. 5 cm long, 3.5 cm wide, many times pinnatisect into narrow linear 5–10 mm long, 0.5–0.8 mm wide, acute or obtuse lobules; upper leaves sessile on sheath with broad white margin. Umbels 5–8(10) cm across, of 15–21 smooth, unequal rays; involucre of 8–9 linear sometimes pinnatifid leaflets becoming recurved; umbellets 7–10 mm across; involu- cels of 1–5 narrow linear acute herbaceous leaflets, longest as long as umbellet or longer; calyx-teeth inconspicuous; petals white, ca. 1.5 mm long, obcordate, deeply notched, with inward curved tip, peripheral elongate (2–2.5 mm); fruit ovoid, 4 mm long, 2.5 mm wide, dark glabrous with violet tinge, with narrow white margin, dorsal ribs filiform. June. (Plate XXI, Figure 2.)

Taluses, possibly in S. Transcaucasia; recorded from the border of the latter with Kagyzman. — Gen. distr.: Arm.-Kurd. Described from N. Ana- tolia. Type in Geneva, cotype in Leningrad.

62 Genus 1052. **FERULA*** L.**

L. Sp. pl. (1753) 246; Gen. ed. V (1754) 117. — Polycyrtus Schlecht. in Linn. XVIII (1843) 126. — Elaeochytris Fenzl in Russegg Reise, 1 (1843) 957. — Scorodosma Bge. in Delect. semhort. Dorpat. (1846) 3. — Sumbulus H. Reinsch. in Jahrb. Pract. Pharm. XIII (1846) 69. — Narthex Falc. in Trans. Linn. Soc. XX, 2 (1847) 285. — Euryangium Kauffm. in Nouv. Mém. Soc. Nat. Mosc. XIII (1871) 258. — Merwia B. Fedtsch. in Bot. mat. gerb. Bot. sada, V (1924) 49

Calyx with entire or denticulate margin; petals more or less yellowish, flat or furrowed by depressed midrib, their apex often acuminate, curved or curved inward, oval or lanceolate. Stylopodium flattened-conical, with flat, widened, more or less lobed margin. Styles short, stigmas subulate, rarely thickened, capitate. Mericarps plano-compressed with broadening but not thickened margins, ribs of mericarps filiform, slightly protruding, rarely acute; lateral ribs not thickened, more removed from dorsal ribs than these are from each other. Pericarp of different structure, ribs with more or less developed mestomes, comprising a sometimes poorly developed bundle of sclerenchyma, mestomes usually entire, but in marginal ribs split up into sev- eral bundles which together with sclerenchyma sometimes fill up inner part of fruit margins; marginal bundles close to or along margin; resinous canals costal or intercostal, costal outside mestomes, often obsolete in ripe fruit; intercostal canals numerous, narrow, often obliterated in ripe fruit or solitary; commissural canals sometimes branching; mesocarp of 2 layers, outer parenchymatous, the inner, especially the hypendocarp, fibrous; fibers of hypendocarp more or less lignifying, often forming thick layer, some- times hardly visible, penetrating into marginal mestomes and with them surrounding seed.

* Treatment by E. P. Korovin.

** From the Latin *ferula* — whip, rod; referring to the former use of the dry stems as instruments of punishment in schools.

Perennial, semi-monocarpous herbs, often with thick and high, sometimes very large stem. Leaves mostly in rosette, their blades always ternately dissected; cauline leaves with well-developed sheaths, rarely sheaths weakly developed. Umbels in panicle, usually without involucre. Usually central umbels with bisexual flowers, lateral with male and mixed flowers, those
 63 with mixed flowers surrounding central umbels, or all umbels equal with connate axes. Umbellets without involucre or with small one. Flowers polygamous-hermaphrodite or male or only female; petals 1 to 3.5 mm long.

More than 130 species in Central Asia, W. Siberia, the Caucasus, the Mediterranean region, N. Africa, Asia Minor, Iran, Afghanistan, China (Sinkiang), and India.

Note. *Ferula* differs from all other platycarpous Umbelliferae merely by the structure of the fruit, not by the arrangement of the umbels. It is distinguished from *Peucedanum*, which resembles some species of *Ferula* in its habit, mainly by the marginal position of the lateral ribs. In the structure of the pericarp *Ferula*, *Dorema* Don, *Ladyginia* Lipsky, *Soranthus* Ldb., *Zozimia* Hoffm., *Pastinaca* L. and *Mala-baila* Hoffm. together constitute a natural group in the subtribe *Eupeucedaneae* Boiss. The anatomical characters of the fruit accepted by Calestani and Kozo-Polyanskii proved invaluable in the natural delimitation and division of the species, but were of little use in the subdivision of the genus.

- 1. All umbels central, i. e., apical on stem and axillary branches, or lateral umbels developed as well 2.
- + Umbels disposed in two ways: at apex of stem and branches, or along laterally, as if pierced by them 92.
- 2. Lobes of lower leaves large, not less than 15–20 mm wide, covered with soft hairs 3.
- + Lobes of lower leaves smaller and much narrower, sometimes reduced to single nerve (if wider than plant devoid of lateral umbels or scabrous, covered with stiff hairs) 16.
- 3. Lobes of lower leaves entire or more or less cut into entire lobules and segments 4.
- + Lobes of lower leaves incised-dentate or simple-dentate 9.
- 4. Ovary and fruit pubescent; plant with thick, sturdy stem, 5–8 cm across with disagreeable smell 1. *F. assa-foetida* L.
- + Ovary and fruit glabrous 5.
- 5. Intercoastal furrows with 1 canal 6.
- + Intercoastal furrows with many canals or canals inconspicuous 7.
- 6. Umbels of 20–25 rays; plant with thick, sturdy stem; leaf lobes oblong-oval, entire; fruit ellipsoid, 20 mm long, 2–4 canals toward commissure 22. *F. kuhistanica* Korov.
- + Umbels of 10–15 rays; leaf lobes oblong, deeply cut into several lobules; fruit ovoid, 12 mm long, 10–12 canals toward commissure 17. *F. iliensis* Krasn.
- 7. Umbels of 10 rays 8.
- + Umbels many-rayed (about 25); stem high, thick; leaf lobes oval, entire or incised-laciniate, with undulant margin; fruit 13 mm long; intercoastal furrows with numerous canals 3. *F. plurivittata* Korov.

8. Intercostal canals inconspicuous; stem thin, ca. 40 cm high; lobes incised-lacinate 2. *F. kelifi* Korov.
+ Intercostal furrows with three canals each; leaf lobes entire, sometimes with few apical teeth 5. *F. primaeva* Korov.
9. Stem nodes distinctly inflated 10.
+ Stem cylindrical 12.
10. Stem much branching to producing spreading panicle; with central umbel only (lateral umbels lacking) 11.
+ Stem branching once [sic], producing spreading panicle; with central umbels, lateral in groups of 3-6 15. *F. diversivittata* Rgl. et Schmalh.
11. Umbels ca. 15 cm wide; fruit with two canals toward commissure 19. *F. inflata* Korov.
+ Umbels half as big; fruit with 6 canals toward commissure 18. *F. latifolia* Korov.
12. Leaf lobes acutely serrate; fruit with 4-5 canals in furrows 29. *F. kokanica* Rgl. et Schmalh.
+ Leaf lobes dentate in upper half; canals solitary in furrows 13.
13. Stem ca. 2 m high, much branching, producing spreading panicle; all umbels terminal, lateral umbels lacking 16. *F. gigantea* B. Fedtsch.
+ Stem branching once [sic], producing dense panicle; two kinds of umbels, terminal and lateral (these disposed in groups of few umbels) 14.
14. Plant with tar-like odor 15.
+ Plant with disagreeable garlic-like odor; stem thick, robust; umbels ca. 15 cm across 21. *F. foetidissima* Rgl. et Schmalh.
15. Stem ca. 2 m high, tapering; leaf lobes lanceolate, entire, rarely incised, rounded-dentate in upper half; fruit 10 mm long 14. *F. conocaula* Korov.
+ Stem half as big, cylindrical, thick, sturdy, red-brown; leaf lobes incised-dentate; fruit ca. 30 mm long 20. *F. jaeschkeana* Vatke.
16. Petals hairy outside 17.
+ Petals glabrous outside 26.
17. Stem or only leaves covered with curly hairs 18.
+ Plant covered with short fine hairs 19.
18. Ovary and fruit densely hairy 12. *F. litwinowiana* K.-Pol.
+ Ovary and fruit glabrous 8. *F. lehmannii* Boiss.
19. Plant high, with thick sturdy stem 20.
+ Plant medium-sized, with thin stem 23.
20. Intercostal furrows with numerous canals 21.
+ Canals 1-2 per furrow 22.
21. Umbels 8-10 cm wide; leaf lobes small, 4-5 mm, long incised-lacinate; canals numerous toward commissure. . . 7. *F. persica* Willd.
+ Umbels ca. 15 cm wide; lobes ca. 10 mm long, oval, incised-blunt-dentate; canals toward commissure inconspicuous 6. *F. tersakensis* Korov.
22. Stem thick, inflated about middle, hollow, branching, producing dense panicle; fruit 20 mm long 24. *F. badrakema* K. -Pol.
+ Stem cylindrical, not hollow; fruit 15 mm long . . . 23. *F. gumosa* Boiss.

23. Umbellets with involucre of 10 lanceolate, hairy, persistent leaf-
lets; stem 30–40 cm high; fruit 7 mm long 28. *F. syreitschikovii* K. -Pol.
+ Umbellets with involucre of small, squamiform, deciduous leaf-
lets or involucre lacking 24.
24. Umbels of 20 rays; leaf lobes ca. 25 mm long 13. *K. karakalensis* Korov.
+ Umbel of 10 rays; lobes 10–15 mm long 25.
25. Umbels of 6–8 rays; leaf lobes oblong, incised-laciniate; fruit
oblong-ovoid; fruit with 3 canals per furrow, 2 toward commissure
..... 10. *F. mogoltavica* Lipsky.
+ Umbels of 7–11 rays; lobes oval, incised-laciniate; fruit globose-
ovoid, with wide margin; canals 5 per furrow, 10 toward commissure
..... 11. *F. szovitsiana* DC.
26. Leaf lobes narrow, filiform to narrowly linear 27.
66 + Lobes different 48.
27. Leaves many times divided into narrow linear lobes not exceeding
10 mm 28.
+ Leaves with elongate lobes 43.
28. Entire plant glabrous 29.
+ Plant covered with stiff hairs or scabrous, with spines at lower
side of leaves 35.
29. Stem sturdy, thick; leaf lobes clustered in small bundles 42. *F. grigorjevii* B. Fedtsch.
+ Stem finger-thick; leaf lobes pinnately arranged 30.
30. Leaf sheaths flat, oval-lanceolate or lanceolate, herbaceous;
petals oval, flat, pale yellow 4. *F. glaberrima* Korov.
+ Leaf sheaths inflated, coriaceous 31.
31. Canals in fruit 2–3 per furrow 32.
+ Canals solitary 33.
32. Umbels ca. 12 cm wide; leaf lobes narrowly linear, 2 mm long; fruit
14 mm long 43. *F. prangifolia* Korov.
+ Umbels of 4–8 rays; lobes 10–12 mm long; fruit 10 mm long 41. *F. fedtschenkoana* K. -Pol.
33. Umbels central only; leaf lobes filiform; fruit with 2 canals
toward commissure 80. *F. eremophila* Korov.
+ Umbels of two kinds: central and lateral; canals 4–6 toward
commissure 34.
34. Leaf lobes short, ca. 2 mm; sheaths oval-lanceolate 45. *F. pachyphylla* Korov.
+ Leaf lobes twice as long; sheaths cylindrical 51. *F. rigidula* DC.
35. Plant densely covered with hairs, grayish 36.
+ Plant covered with spines, scabrous 40.
36. Umbellets 20-flowered; fruit 15–16 mm long without canals toward
commissure 37. *F. linczevskii* Korov.
+ Umbellets 10–15-flowered; fruit not longer than 14 mm with 2–6
canals toward commissure 37.
37. Sheaths of leaves inflated, coriaceous; fruit not less than 10 mm
long 38.
+ Sheaths herbaceous, nearly flat; leaf lobes linear 39.

38. Leaf lobes linear, acuminate, ca. 10 mm long; sheaths oval; fruit 14 mm long 60. *F. pallida* Korov.
 + Lobes to 12 mm long; sheaths lanceolate; fruit 10 mm long 62. *F. angreni* Korov.
39. Leaves and sheaths withering, soft, leaf lobes linear; fruit 8 mm long 63. *F. kopetdagensis* Korov.
- 67 + Sheaths herbaceous, nearly flat; leaf lobes linear, ca. 2 mm long; fruit 6–7 mm long 59. *F. dissecta* Ldb.
40. Sheaths oval; leaf lobes linear, 2–5 mm long 41.
 + Sheaths lanceolate or oblong-lanceolate 42.
41. Leaf lobes narrowly linear, pinnately arranged; green plants 61. *F. tenuisecta* Korov.
 + Leaf lobes linear, radially arranged; plant pale green 55. *F. stylosa* Korov.
42. Sheaths cylindrical; fruit oblong-elliptic 51. *F. rigidula* DC.
 + Sheaths oblong-lanceolate; fruit ellipsoid 64. *F. orientalis* L.
43. Plant with central umbels; leaf lobes narrowly linear or filiform . . 44.
 + Plant with central and lateral umbels 45.
44. Stem branching from middle, producing broad panicle; leaf lobes narrowly linear, filiform, ca. 30 mm long, sometimes slightly scabrous; sheaths oblong-oval; fruits on long pedicels 76. *F. karatavica* Rgl. et Schmalh.
 + Stem twice furcately branching; leaf lobes filiform, ca. 40 mm long; sheaths narrowly lanceolate; pedicels as long as fruit 74. *F. gypsacea* Korov.
45. Sheaths oval, coriaceous, inflated 46.
 + Sheaths herbaceous, flat 47.
46. Tall glaucescent plant; leaf lobes filiform, straight, shiny, to 90 mm long; umbels of 10–18 rays; fruit 6–7 mm long, obovoid 75. *F. ugamica* Korov.
 + Plant ca. 50 cm high, glaucous; leaves with thick whitish rhachis, their lobes filiform, to 60 mm long; umbels of 8–14 rays, twice as wide as preceding; fruit glaucous, 14–15 mm long 40. *F. lipskyi* Korov.
47. Leaf lobes filiform, to 15 cm long; umbels of 8–15 rays, to 20 cm wide; fruit ellipsoid, glaucescent, 15 mm long 38. *F. equisetacea* K. -Pol.
 + Lobes half as long; umbels of 17–27 rays, ca. 8 cm across; fruit 15 mm long 39. *F. koso-Poljanskyi* Korov.
48. Leaf lobes linear-lanceolate to narrowly lanceolate, entire 49.
 + Lobes different, always incised-dentate 60.
49. Sheaths of leaves large, broadly oval; lobes linear-lanceolate, acuminate 50.
 + Sheaths much smaller and narrower 51.
- 68 50. Leaves bright green; sheaths wider than long; umbellets with 15–20 flowers 78. *F. badhysi* Korov.
 + Leaves gray-green; sheaths oval; umbellets with 10–15 flowers 79. *F. oopoda* (Boiss. et Buhse) Boiss.
51. Leaf lobes broadly linear, 5–7 times longer than wide 52.
 + Lobes linear-lanceolate, acuminate 54.

52. Stem high, thin, nearly leafless with central umbel only, a sparse panicle of 5–11 rays; umbellets 20-flowered; fruit 6–7 mm long 82. *F. korshinskyi* Korov.
+ Stem leafy 53.
53. Sheaths with oblique base; umbels in sparse panicle; leaf lobules to 10 mm wide, 50 mm long; fruit 11 mm long. 83. *F. clematidifolia* K. -Pol.
+ Sheaths with erect base; umbels in broad panicle; leaf lobules 40 mm long and 8 mm wide; fruit 10–13 mm long 84. *F. penninervis* Rgl. et Schmalh.
54. Leaf lobes narrowly lanceolate, with few parallel whitish nerves . . . 55.
+ Lobes narrow, linear-lanceolate, acuminate, with midrib only 56.
55. Umbellets with involucre of herbaceous leaflets; leaf lobes to 9 cm long; fruit with 1 canal per furrow, 2 toward commissure 72. *F. involucrata* Korov.
+ Umbellets without involucre; lobes shorter and narrower; fruit with 1 canal per furrow, 8 toward commissure 71. *F. leucographa* Korov.
56. Sheaths herbaceous, nearly flat. 57.
+ Sheaths coriaceous, inflated 58.
57. Umbellets with involucre of herbaceous, persistent leaflets; umbels of 10–20 rays; fruit 8 mm long. 88. *F. songorica* Pall.
+ Umbellets without involucre; umbels of 4–5 rays; fruit 8–9 mm long 81. *F. tatarica* Fisch.
58. Plant with thin stem, ca. 50 cm high; umbels impoverished, of 3–6 rays, with involucre of unequal leaflets; sheaths of leaves oblong-oval; leaf lobes to 30 mm long, 2 mm wide; fruit 13 mm long 73. *F. aitchisonii* K. -Pol.
+ Plant larger; umbels of 10–20 rays; involucre lacking 59.
59. Sheaths oval-lanceolate; umbels of 15–20 rays, ca. 10 cm wide; lateral umbels 1–2 85. *F. kaschkarovii* Korov.
+ Sheaths oval-lanceolate; umbels of 10–15 rays, ca. 6 cm across; lateral umbels 2–6 77. *F. schair* Borszcz.
60. Plant entirely glabrous, glaucous; leaf lobes incised-dentate in upper part 61.
+ Plant with soft hairs or scabrous, covered with stiff hairs 64.
61. Low plant, ca. 30 cm high, with terminal umbels only; leaf lobes lanceolate tripartite, 3 mm long; fruit 6 mm long, with glaucous bloom 49. *F. nuda* Spreng.
+ Plant higher, with two kinds of umbels 62.
62. Fruit broadly ellipsoid, with 4 canals toward commissure; plant with thin stem, umbels of 5–10 rays. 48. *F. karategina* Lipsky.
+ Fruit ellipsoid with 6 canals toward commissure; plant twice as large 63.
63. Leaf lobes broadly linear, widening at apex, incised, acutely toothed; umbels of 5–10 rays; fruit 11 mm long 47. *F. ceratophylla* Rgl. et Schmalh.
+ Lobes linear, acutely toothed at apex, ca. 15 mm long; umbels of 4–10 rays; fruit 10 mm long. 46. *F. tschimganica* Lipsky.

64. Plant, at least leaves, covered with soft hairs 65.
 + Plant scabrous, covered with stiff hairs 73.
65. Umbels terminal only; sheaths herbaceous, flat, not inflated 66.
 + Umbels terminal and lateral; sheaths inflated. 67.
66. Stem thin, ca. 2 m high; leaf lobes cut into toothed lobules, to 50 mm long, withering; umbels of 10–20 rays
 70. *F. pseudooreoselinum* (Rgl. et Schmalh.) K. -Pol.
 + Stem half as large; leaf lobes narrower, oblong-lanceolate, tri-partite; umbels of 6–10 rays 69. *F. moschata* (Reinsch) K. -Pol.
67. Plant with thick robust stem 68.
 + Plant with thin stem 69.
68. Fruit 10–12 mm long, intercostal furrows with 1–2 canals; umbellets 20-flowered. 25. *F. teterrima* Kar. et Kir.
 + Fruit 14–15 mm long; canals 2–3 per furrow; umbellets with 10–13 flowers 26. *F. krylovii* Korov.
69. Umbellets with involucre of 10 leaflets; leaf lobes canescent, oval, incised-dentate; fruit with whitish margin, oblong-elliptic
 27. *F. canescens* Ldb.
 + Umbellets without involucre or these reduced to small deciduous scales 70.
70. Fruit with 3–5 canals per furrow 71.
 + Fruit with 1 canal per furrow. 72.
71. Plant canescent; leaf lobes oval, to 20 mm long, pinnatifid into dentate lobules; umbels of 4–9 rays; fruit 9–13 mm long; petals flat, pale yellow 9. *F. microloba* Boiss.
 + Plant pale green, subglabrous; leaf lobes oblong, dentate, 4 mm long; umbels of 3–8 rays; petals yellow, curved inward
 35. *F. subtilis* Korov.
72. Leaf lobes ca. 20 mm long, oval, large-toothed; umbels of 10 rays; fruit 10 mm long. 67. *F. mollis* Korov.
 + Leaf lobes oval, palmatifid into dentate lobules, 20 mm long; umbels of 15 rays; fruit 10 mm long 68. *F. latiloba* Korov.
73. Umbellets with involucre of 5–7 herbaceous, persistent leaflets . . 74.
 + Umbellets without involucre or involucre of few membranous leaflets 75.
74. Leaf lobes 10 mm long cut into lanceolate, dentate lobules, lateral umbels disposed in groups of 2–4; petals oblong
 87. *F. akitschkensis* B. Fedtsch.
 + Leaf lobes 8 mm long; oval, incised-laciniate, lateral umbels disposed in groups of 1–2 86. *F. transitoria* Korov.
75. Leaf sheaths narrow, lanceolate, amplexicaul; petals pale brown . . 76.
 + Sheaths different, wider, amplexicaul only in lowermost leaves; petals yellow. 77.
76. Umbels of 3–10 rays; leaf lobes cut into lanceolate lobules.
 90. *F. karataviensis* (Rgl. et Schmalh.) Korov.
 + Umbels of 2–4 rays; leaf lobes cut into linear lobules
 91. *F. vicaria* Korov.
77. Leaves thin, bright green, withering, slightly scabrous; sheaths hardly inflated; canals 2–3 per furrow, 6–8 toward commissure. . . 78.

- + Leaves thickish, dark green, scabrous; sheaths inflated; canals
1 per furrow, 2 toward commissure. 83.
78. Stem thin, ca. 40 cm high; umbels of 3-6 rays. 34. *F. leiophylla* (K. -Pol.) Korov.
- + Stem thick, ca. 1 m high; umbels of 10 rays or more 79.
79. Umbels of many rays (18-27); leaf lobes oval, 15 mm long, incised,
acutely toothed; fruit 8-12 mm long, pale brown; canals 1, rarely
2 per furrow, 6-8 toward commissure 31. *F. foliosa* Lipsky.
- 71 + Umbels often of 10, rarely to 18, rays; 2-5 canals per furrow,
6-8 toward commissure 80.
80. Fruit ca. 15 mm long, acuminate at both ends; umbels of 8-10 rays;
leaf lobes 20 mm long, incised, acutely toothed. . . 36. *F. nevskii* Korov.
- + Fruit rounded at both ends, smaller. 81.
81. Stem distinctly inflated at nodes 30. *F. tuberifera* Korov.
- + Stem cylindrical 82.
82. Umbels of 8-14 rays; stem single; fruit olive-colored.
. 32. *F. samarcandica* Korov.
- + Stems few; umbels of 10-18 rays; fruit brown. . 33. *F. kelleri* K. -Pol.
83. Glaucous, subglabrous plants 84.
- + Canescent plant, covered with stiff hairs. 85.
84. All umbels terminal; leaf sheaths flat, herbaceous, lanceolate; leaf
lobes oval, 10 mm long, incised-dentate 50. *F. potaninii* Korov.
- + Umbels terminal and lateral; sheaths stiff, inflated, oval-lanceolate;
leaf lobes 5 mm long, linear, incised-laciniate
. 44. *F. minkwitzae* Korov.
85. Leaf lobes longer than 20 mm, oval 86.
- + Leaf lobes not more than 10 mm long. 87.
86. Umbels of 11 rays, ca. 8 cm wide; leaf lobes with broad base,
notched-dentate with undulant margin; fruit oblong-ellipsoid
. 65. *F. xeromorpha* Korov.
- + Umbels of 10 rays, ca. 10 cm wide; leaf lobes decurrent, incised-
dentate; fruit oblong-elliptic, 10 mm long 66. *F. ligulata* Korov.
87. Canals 2-3 per furrow, 8 toward commissure; leaf lobes pinnati-
sect into curly lobules; umbels of 5-10 rays; fruit 8 mm long
. 54. *F. dshizakensis* Korov.
- + Canals 1 per furrow, 2-6 toward commissure; leaf lobes dentate
or repeatedly divided into linear lobules. 88.
88. Plant not more than 40 cm high; umbels of 5-10 rays, 3-6 cm
wide 89.
- + Plant much larger; umbels ca. 10 cm wide 90.
89. Stem thin; sheaths oval; umbels 3 cm wide; fruit 5-6 mm long.
. 53. *F. microcarpa* Korov.
- 72 + Stem thick; umbels 1½ times as large; fruit 7-10 mm long.
. 52. *F. ovina* Boiss.
90. Fruit 15 mm long; umbels 8 cm wide; leaf lobes trisected into
overlapping linear lobules 58. *F. ferganensis* Lipsky.
- + Fruit not more than 10 mm long; umbels smaller 91.
91. Plant covered with branching hairs, canescent; umbels of 8-13
rays, 8-10 cm wide. 57. *F. rubroarenosa* Korov.

- + Plant covered with sparse stiff hairs, glaucescent, umbels of 6–12 rays, 3–6 cm wide. 56. *F. lapidosa* Korov.
- 92. Stems distinctly inflated at nodes; leaf lobes ca. 4 cm wide, acutely serrate; sheaths ovate . . . 92. *F. schtschurowskiana* Rgl. et Schmalh.
- + Stems cylindrical; leaf lobes ca. 10 mm long 93.
- 93. Umbels many; stem thick, ca. 1 m high; leaves canescent, their lobes ca. 10 mm long 93. *F. ferulaeoides* (Steud.) Korov.
- + Umbels smaller; stem thin 94.
- 94. Sheaths stiff, lanceolate; stems and leaves densely covered with short white hairs; plant not more than 40 cm high 96. *F. dshaudshamy* Korov.
- + Sheaths soft, herbaceous; leaves glabrous or pubescent 95.
- 95. Glabrous or subglabrous plant 96.
- + Leaves hairy beneath, their lobes small, oval, pinnatipartite or incised; fruit 4–5, rarely to 9 mm long; plant ca. 30 cm high 95. *F. caspica* M. B.
- 96. Glabrous plant; leaf lobes linear-lanceolate, 2–4 mm long; fruit 9 mm long. 94. *F. caucasica* Korov.
- + Sparingly pubescent plant; leaf lobes oval, 5–10 mm long, pinnatipartite into linear-lanceolate lobules; umbels terminal, lateral, sometimes overlapping; fruit 6–7 mm long. 89. *F. gracilis* Ldb.

Subgenus 1. **Scorodosma** (Bge.) Drude in E. u. P. Pflanzenfam. III, 8 (1898) 230. — Genus *Scorodosma* Bge. in Delect. sem Horti Dorpat. (1846) 3 et in Rel. Lehman. (1851) 13. — Petals flat, rather large, 3.5 mm long, whitish, long persistent on ovary; stylopodium flat, widening with lobate margin; styles elongate, with capitate, flattened, obliquely inserted stigmas; mericarps flat-compressed, with markedly widened margin; canals numerous in furrows and toward commissure, often obliterated in ripe fruit. Monocarpic herbs, with thick spongy robust stem; leaves with large lobes, rapidly withering, covered with soft hairs. One polymorphic species, widespread in the deserts of SW Asia. Plant with typical garlic odor.

1. *F. assa-foetida* L. Sp. pl. (1753) 248; Boiss. Fl. or. II, 994. — *F. foetida* Rgl. in Tr. Bot. Sada, V (1878) 592, inadnot. — *F. Scorodosma* Bentley et Trim. Med. pl. (1180) tab. 131. — *Scorodosma foetidum* Bge. in Delect. sem. Horti Dorpat. (1846) 3 et in Rel. Lehmann. (1851) 133. — *Peucedanum Asa-foetida* Baill. Hist. pl. VII (1880) 185. — Ic.: Borscz. in Mém. Ac. Sc. Pétersb. VII ser. III, 8 (1860) tab. 1–2; Korov., Monogr. (1947) Table I Fig. 1–2.

Perennial; root inflated, ovoid, monocarpic plant; stem thick, ca. 1 m high, robust, branching in upper part to produce dense globular panicle; lower leaves alternate, upper disposed in few whorls; leaves soft, early withering, mostly glabrous above, more or less soft-haired beneath; radical leaves with short thick petioles; blade broad, ternately dissected, its lobes bipinnatisect into large oblong or oblong-lanceolate or lanceolate, 15 cm long, 5 cm wide decurrent lobules, rounded at apex, entire or deeply cut into few, often entire segments; cauline leaves much smaller, upper

reduced to sheaths; sheaths oval, flat, chartaceous, covered with curly hairs outside. Umbels variable, terminal sessile or on reduced pedicels, of 25 rays, spherical, 15–20 cm wide, lateral on long pedicels in groups of 3–6; umbellets 15-flowered, dense, hairy, without involucre; calyx edentate; petals pale yellow, nearly cream, oval, flat, 3.5 mm long; stylopodium elongate; stigmas flattened-capitate; mericarps plano-compressed, with broad margin, pubescent, ellipsoid or globular-ovoid, emarginate, 16–22 mm long, 16–12 [sic!] mm wide; ribs filiform, slightly protruding; canals very narrow, sometimes hardly distinguishable, numerous. Fl. March–April, Fr. April–May.

Deserts. — Centr. Asia: Kyz. K., Kara K., Mtn. Turkm. (Badkhyz). Gen. distr.: Iran (Iran, Afghanistan). Described from Iran. Type in London.

Economic importance. *F. assa-foetida* L. is an ancient Persian officinal plant which has spread from Iran to many other countries. For medicinal purposes the stem is removed at the end of the vegetative period, when the leaves wither, the root is uncovered and a thin slice is removed. The root then yields a milky juice which turns brown and hardens in air. This is gathered with a part of the root and another layer is cut to obtain more milky juice. The product contains gum (12–35%), essential oil (3–6%) and resin (50–70%). The gum contains bassorin; the essential oil contains sulphur and has a disagreeable odor. The resin contains ester as a resinotannol with ferulic acid and free ferulic acid and a small quantity of vanillin. As a tincture it is used in the treatment of convulsions. The fruits yield much fat and protein and are fed to horses and sheep in the winter. The starch in the root is eaten as porridge after being soaked in water to remove its odor and unpleasant taste.

Subgenus 2. *Merwia* (B. Fedtsch.) Korov., Monogr. (1947) 8. — Genus *Merwia* B. Fedtsch. in Bot. mat. gerb. Bot. sada. V (1924) 45. — Petals pale yellow, to 2 mm long, nearly flat, with short inward curved tip, long persistent on ovary, nearly always hairy outside; stylopodium flat, widening, lobate; styles with thickened stigmas; mericarps strongly compressed, sometimes flattened, generally with moderately widened margins; canals numerous in furrows, irregularly disposed, sometimes divided. Mostly polycarpic herbs, covered with soft hairs (except *F. glaberrima*); leaves soft, early withering, usually dissected into small lobules; branches distinctly thickening at maturation. Fifteen species in the deserts and dry mountain belt of SW Asia. Parts of the plant have a typical garlic-like odor.

Section 1. *SAPROSMIA* Korov., Monogr. (1947) 8. — Leaf lobules more than 5 cm long.

2. *F. kelifi* Korov., Monogr. (1947) 25. — Ic.: Korov., *ibid.*, Table I, Figure 3; Table II, Figure 1.

Perennial; neck sometimes branching, covered with bristly fibrous remnants of leaves; stems 1–3, thin, 40–50 cm high, sometimes reddish,

branching above to produce sparse panicle; leaves not wilting rapidly, pale green, hairy on both surfaces, its ternate-dissected sections pinnatisect into oval, short-decurrent, entire or notched or incised, 4 cm long lobules tapering at base; cauline leaves with reduced blade, with oblong or lanceolate sheath. Umbels vary, terminal umbel ca. 5–6 cm across, short-pediceled, of 10, rarely more rays, lateral umbels of 1–4 rays; umbellets 15-flowered, without involucre; calyx edentulate; petals pale yellow, oval, acuminate, flat, pubescent, 2 mm long; stylopodium expanding, flat; styles without thickened stigmas; mericarps 7 mm long, ovoid, inflated, 75 with broad margin and thick pericarp; ribs very thin, inconspicuous; canals narrow, numerous, scattered, sometimes indistinguishable toward commissure. Fl. May, Fr. June.

Gypsiferous, variegated foothills. — Centr. Asia: Pam. -Al. (foothills of Gissar Range). Endemic. Described from Kelif. Type in Tashkent.

3. *F. plurivittata* Korov., Monogr. (1947) 25. — Ic.: Korov., ibid., Table III, Figure 1.

Perennial; stem thick, ca. 1 m high, paniculately branching above; leaves not wilting soon, pale green, both surfaces covered with soft hairs; lower leaves ternate, their sections bipinnatisect into oval, decurrent, entire or incised-laciniate lobules with undulant margin, 6 cm long, 3 cm wide. Umbels variable, terminal subsessile, of 15–20 rays, to 13 cm across, spherical, lateral in groups of 2–3, on long, thickened pedicels; umbellets 15-flowered, without involucre, flowers unknown; mericarps red-brown, inflated, obcordate, with broad margin, 13 mm long, 8 mm wide, slightly longer than pedicels; ribs thin, inconspicuous; canals numerous, inflated, filling pericarp, 6–8 toward commissure, many canals at margin of mericarp. Fr. May.

Slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Kyurendag Mountain near Kazandzhik. Type in Leningrad.

Section 2. *PHACOCARPA* Korov., Monogr. (1947) 8 — Fruit inflated, with narrow margin; leaf lobules small.

4. *F. glaberrima* Korov., Monogr. (1947) 26. — Ic.: Korov., ibid., Table III, Figure 2.

Perennial; glabrous acaulescent plant; stem ca. 50 cm high, thin, with white prominent striae, branching above to produce panicle, branches clustered in a few groups; cauline leaves with ternately dissected blade, with oblong amplexicaul sheath appressed to stem; segments of first order tripinnatisect into short linear pinnatifid lobules. Umbels variable, terminal on short pedicels, of 8–12 rays, ca. 15 cm across, rays becoming distinctly thickened, lateral umbels 1–2; umbellets 10-flowered, dense, without involucre; calyx edentulate; petals pale yellow, oval, flat, short-acuminate, 2 mm long; stylopodium flat, becoming cup-shaped in fruit; stigmas not capitate; mericarps flat, oval, with narrow margin, 9 mm long, 6 mm wide; ribs filiform, slightly protruding; canals many (6–7) in furrow, to 20 toward commissure. Fr. June.

Deserts. — Centr. Asia: Balkh. Endemic. Described from the Muyun-Kum desert. Type in Tashkent.

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5. *F. primaeva* Korov., Monogr. (1947) 26. — Ic.: Korov., *ibid.*, Table III, Figure 2.

Perennial; stem thick, ca. 1 m high; leaves pale green, hairy on both surfaces, ternate-dissected into pinnatisect sections divided into 3–5 cm long, oblong-oval, decurrent, slightly dentate lobules, tapering at base; umbels variable, terminal of 7 rays, spherical, 10 cm across, lateral umbels 2; umbellets 15-flowered, without involucre, pedicels thickened in fruit; flowers unknown; mericarps dark red, flattish, ovoid, 10 mm long, with narrow margin; ribs sharply protruding, very narrow, canals 3 per furrow, 8 toward commissure. Fr. May.

Gypsiferous soils. — Centr. Asia: Pam. -Al. Endemic. Described from Baisun. Type in Tashkent.

6. *F. tersakensis* Korov., Monogr. (1947) 26. — Ic.: Korov., *ibid.*, Table IV, Figure 2.

Perennial; stem thick, robust, ca. 1 m (?) high, becoming violet; branches thickened; leaves ca. 20 cm-long, soon wilting, pubescent on both surfaces, multipinnatisect into more or less oval, decurrent lobules, broadening in upper half, incised and obtusely dentate or simple-dentate. Umbels variable, terminal sessile, nearly spherical, of 25 rays, ca. 15 cm across, lateral 5–6, crowded at base of central umbel; umbellets with 15–25 flowers, without involucre; calyx edentulate; petals oblong-oval, acuminate, flat, slightly hairy outside, 2.2 mm long; stylopodium widening, its margins lobate, ascending; styles elongate, with flattened globular stigmas; mericarps plano-compressed, oval, with broad margin, 10 mm long; ribs protruding sharply; canals very narrow, numerous in furrows, inconspicuous toward commissure. Fl. May. (Plate IX, Figure 2.)

Clayey depressions in steppes. — Centr. Asia: Balkh. Endemic. Described from Tersakan. Type in Leningrad.

7. *F. persica* Willd. Sp. pl. I (1797) 1413; Ldb. Fl. Ross. II, 301; Grossg., Fl. Kavk. III, 177. — *F. puberula* Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 98. — *Peucedanum persicum* Baill. Hist. pl. VII (1880) 186. — Ic.: Andr. Bot. Rep. IX (1809) tab. 558; Bot. Mag. XLVI (1818) tab. 2096; Korov., Monogr. (1947) Table VI, Figure 1.

Perennial; polycarpic; stem ca. 1 m high, thick, robust, whitish, paniculately branching from middle; lower branches alternate, upper in whorls; leaves soft, soon wilting, canescent beneath; radical leaves broadly rhombic, ternate, their segments pinnatisect into more or less oval, decurrent incised-lacinate lobules, hardly 4–5 mm long; cauline leaves early wilting with reduced blade on broad, flat, oval sheaths. Umbels variable, terminal sessile, of 17–22 rays, 8–10 cm wide, lateral, single or 2 on long pedicels; umbellets 15-flowered, without involucre, with thickened node; calyx edentulate; petals pale yellow, oval, flat, hairy outside, acuminate, 2.5 mm long; stylopodium flattened-conical; mericarps 11 mm long, 6 mm wide, yellow, dorsally inflated, ovoid, with narrow margin; ribs filiform; canals narrow, many (5–7) in furrows, 16–18 toward commissure. Fr. April. (Plate X, Figure 1.)

Dry slopes, to 2,000 m. — Caucasus: E. and S. Transc. Gen. distr.: Iran. Described from Iran. Type in Geneva.

8. *F. lehmannii* Boiss. Fl. or. II (1872) 992. — *F. persica* Bge. in Mém. Sav. Etr. Ac. Sc. Pétersb. VII (1854) 305, non Willd.; Borscz. in Mém. Ac. Pétersb. VII, ser. III, 8 (1860) 17, non Willd. — Ic.: Korov., Monogr. (1947) Table VI, Figure 2.

Perennial; polycarpic, with cylindrical root; stem ca. 0.5 m high, thin, branching from middle to produce sparse panicle; branches alternate, upper clustered in few groups; leaves grayish, pubescent, rather persistent; radical leaves ternately dissected, their segments tripinnatisect into oval, acutely incised-dentate, 2 cm long lobules; cauline leaves on lanceolate sheaths with reduced blade of narrower and longer lobules. Umbels variable, terminal subsessile, of 8–11 rays, 6–8 cm wide, lateral mostly solitary, on long thickened pedicels; umbellets 10-flowered, dense, without involucre or with 1–2 deciduous leaflets at base; sepals small, broadly triangular; petals pale yellow, oval, flat, hairy outside, 2 mm long; stylopodium broad, flat, with thickened margins; stigmas slightly thickened; mericarps oval, flat, with narrow margin, 7–12 mm long, 4.5–5 mm wide; ribs filiform, hardly protruding; canals 6 in each furrow, 12–14 toward commissure, narrow. Fl. May, Fr. June. (Plate X, Figure 2.)

Sandy-clayey deserts, among wormwood. — Centr. Asia: Ar. -Casp., Kyz. K., Kara K. Endemic. Described from Kyzyl-Kum. Type in Geneva.

Economic importance. The roots are used for food by the local population.

9. *F. microloba* Boiss. Fl. or. II (1872) 989. — *F. collina* Freyn in Mém. Herb. Boiss. (1900) 25. — Ic.: Korov., Monogr. (1947) Table VII, Figure 1.

78 Perennial; plant canescent, covered with soft short hairs, sometimes violet; stem ca. 0.5 m high, thin, branching above to produce sparse panicle; leaves rather persistent, glabrous above, covered with short, soft hairs beneath; radical leaves with short sturdy petioles, with broadly rhombic, ternately dissected blade; segments of first order 2–3-pinnatisect into small, to 2 cm long lobules, pinnatifid into oval, acutely toothed sections; cauline leaves with oval or oblong-oval, slightly inflated sheath. Umbels variable, terminal on short pedicels, of 4–9 rays, 8 cm across, lateral umbels 1–2; umbellets 10-flowered, without involucre; calyx-teeth small, broadly triangular; petals pale yellow, oblong-oval, flat, acuminate, 2.5 mm long; stylopodium widening, flat; styles not thickened; mericarps plano-compressed, oval, with broad margin, 9–13 mm long, 6–9 mm wide; ribs filiform, slightly protruding; canals very narrow, 4–5 per furrow, 8–10 toward commissure. Fl. April–May, Fr. May–June.

Foothills and plains on clayey, slightly saline soils at the foot of mountains. — Caucasus: S. Transc.; Centr. Asia: Kyz. K., Mtn. Turkm. Gen. distr.: Iran (Iran, Afghanistan, Beluchistan). Described from Iran (Saidabad and Shah Rud). Type in Geneva.

10. *F. mogoltavica* Lipsky, on label in the V. L. Komarov Herbarium of the Botanical Institute of the Academy of Sciences of the USSR; Korov., Monogr. (1947) 28. — Ic.: Korov., *ibid.*, Table VII, Figure 2.

Perennial; canescent, covered with soft hairs; stem thin, becoming violet, branching above to produce subcorymbiform panicle; branches distinctly thickening at maturation; leaves thickish, rather persistent, glabrous above, soft-haired beneath; radical leaves on short sturdy petioles with broadly rhombic blade, ternately dissected into segments bipinnatisect into oblong, to 2 cm long lobules, these in turn incised-laciniate, 2–3-toothed; cauline leaves with reduced blade, on oblong wilting sheath. Umbels variable, terminal on short pedicels of 6–8 rays, ca. 8 cm wide, lateral umbels 2, opposite, on long pedicels; umbellets 8–10-flowered, dense, without involucre; calyx edentulate; petals pale yellow, oblong-oval, acute, flat, slightly hairy outside, 2.5 mm long; stylopodium flat, broad with lobed margin and reduced stigmas; mericarps oblong-oval, markedly inflated, with flat margin, 12 mm long, 5 mm wide; ribs protruding rather sharply with 3 broad canals per furrow, 2 narrow canals toward commissure. Fl. April, Fr. May.

81 Dry slopes. — Centr. Asia: T. Sh. (W.). Endemic. Described from Mogol-Tau. Type in Leningrad.

Section 3. DISCICARPA Korov., Monogr. (1947) 8. — Fruit with widened margin; leaf lobules small.

11. *F. szovitsiana* DC. Prodr. IV (1830) 174; Ldb. Fl. Ross. II, 304; Boiss. Fl. or. II, 994; Grossg., Fl. Kavk. III, 177. — *Peucedanum Szovitsianum* Baill. Hist. pl. VII (1880) 186. — Ic.: Korov., Monogr. (1947) Table IV, Figure 1.

Perennial; stem ca. 0.5 m high, thin, branching above to produce sparse panicle; lower branches alternate, upper gathered in few groups; leaves persistent, with scattered hairs on both surfaces; radical leaves with short petioles, and triangular, ternately dissected blade; primary segments 2- or 3-pinnatisect into small lobules not longer than 15 mm, these oval, incised-laciniate with toothed sections; cauline leaves with reduced blade and lanceolate, chartaceous sheaths. Umbels variable, terminal sessile or on short pedicels, of 7–11 rays, lateral single; umbellets with 8–12 flowers, without involucre; calyx edentulate; petals oblong, flat, slightly hairy outside, 1.5 mm long; mericarps circular-oval, plano-compressed, with broad margin, 13 mm long, 11 mm wide; ribs filiform, slightly protruding; canals narrow, 6 per furrow, 10 toward commissure. Fr. June–July. (Plate IX, Figure 1.)

Solonchak in dry deserts. — Caucasus: S. Transc. Gen. distr.: N. Turkey (Kulp). Described from the vicinity of Nakhichevan. Type in Leningrad.

12. *F. litwinowiana* K.-Pol. in Spis. rast. gerb. russk. fl. VIII (1922) 111. — Ic.: Korov., Monogr. (1947) Table V, Figure 1. — Exs.: G. R. F. No. 2617.

Perennial; root fusiform; stem about 0.5 m high, thin, covered with shiny curly hairs, branching from middle, lower branches alternate, upper gathered

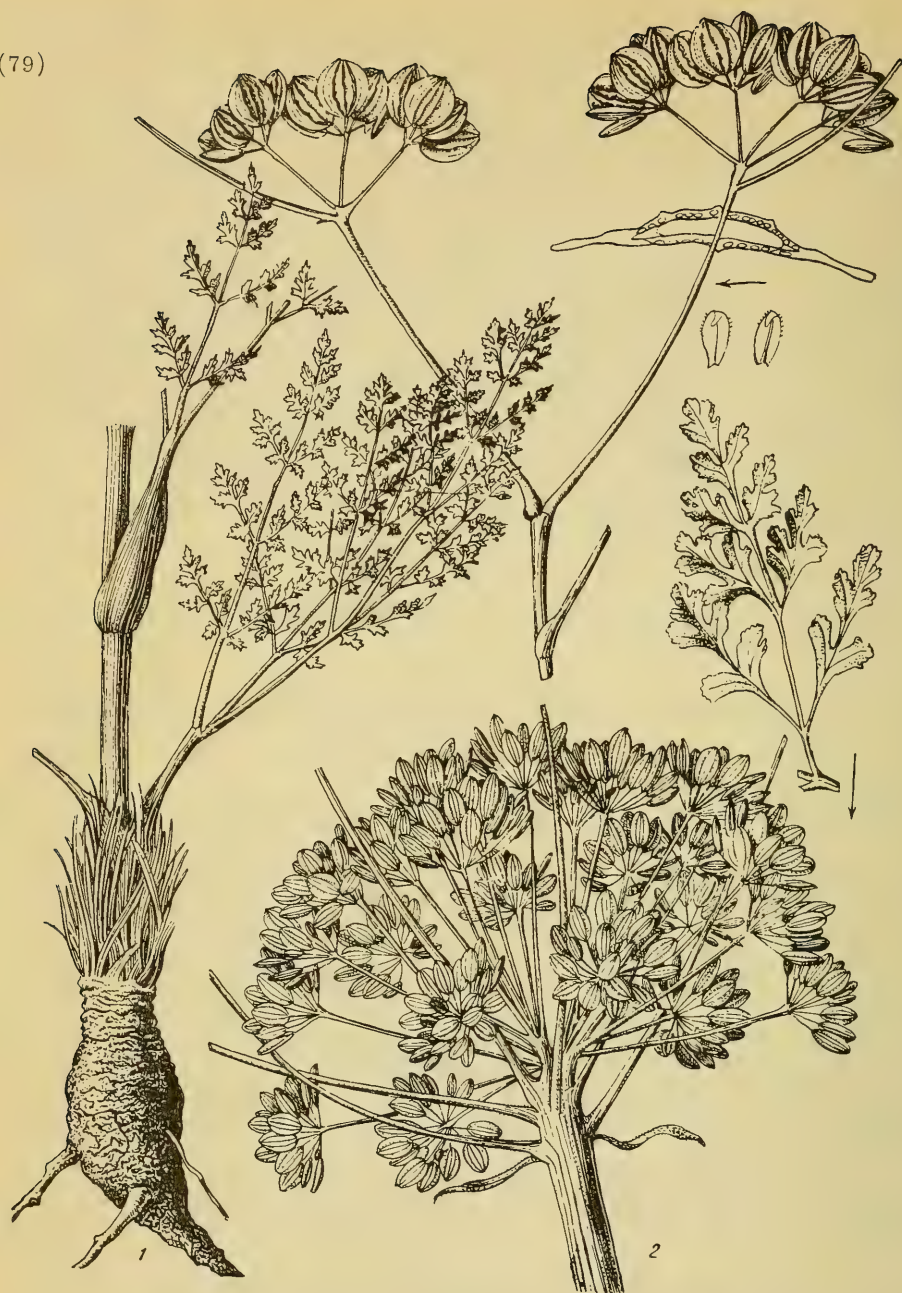


PLATE IX. 1—*Ferula szovitsiana* DC.; 2—*F. tersakensis* Korov.

in few groups; leaves soft, slightly wilting, pubescent, ternately dissected with segments of first order tripinnatisect into lanceolate or oblong, 30 mm long, 6 mm wide, entire or incised-dentate lobules; cauline leaves with oval or oblong divergent sheaths. Umbels variable, terminal subsessile or sessile, of 11–15 thickened rays, 5–8 cm across, lateral often opposite, on long thickened pedicels; umbellets 10-flowered, with involucre; flowers on short, later swollen pedicels; calyx edentulate; petals whitish, with dark spot in middle, flat, with curved tip, hairy outside, 2.2 mm long; stylopodium flat, broad, lobate, olive-colored; styles not capitate; mericarps flat, with rim widening into wing, broadly oval, emarginate, pubescent, 16 mm long, 10 mm wide; ribs thin, filiform, hardly protruding; canals 7 per furrow, 16 toward commissure. Fl. April–May, Fr. May–June.

Sands. — Centr. Asia: Kara K., Kyz. K., Balkh. (W. Bet-Pak-Dala). Endemic. Described from Repetek. Type in Leningrad.

13. *F. karakalensis* Korov., Monogr. (1947) 29. — Ic.: Korov., *ibid.*, Table V, Figure 2.

Perennial; canescent, covered with short soft hairs; stem ca. 1 m high, reddish-brown, robust, rather thick, branching from middle to produce ovoid panicle; leaves slightly wilting, hairy on both surfaces, becoming glabrous above; radical leaves short-petioled, with broadly triangular, ternate-dissected blade; segments of first order tripinnatisect into more or less oval decurrent lobules to 25 mm long, 18 mm wide, incised-laciniate, with subrounded irregularly toothed sections; cauline leaves with obsolete blade or reduced to oblong-oval, chartaceous, wilting sheath. Umbels variable, terminal sessile, of 15–20 rays, spherical, to 10 cm across, lateral 2–4, crowded on long pedicels; umbellets 15-flowered, without involucre; calyx edentulate; petals yellow, oval, short-acuminate, flat, sparingly pubescent outside, 2 mm long; stylopodium flat with thickened margin, entire; styles not thickened; mericarps plano-compressed, rounded-oval, with broad flat margin, emarginate, red-brown, 13 mm long, 11 mm wide; ribs thin, hardly protruding; 5–6 canals per furrow, 10–12 toward commissure. Fl. April, Fr. May–June.

Stony slopes in lower arid mountain belt. — Centr. Asia: Mtn. Turkm. Endemic. Described from W. Kopet Dag (Karakal). Type in Leningrad.

Subgenus 3. *Narthex* (Falc.) Drude in E. u. P. Pflanzenfam. III, 8 (1898) 229. — Genus *Narthex* Falc. in Trans. Linn. Soc. XX, 2 (1847) 285. — Petals yellow, rarely pale yellow, often concave with curved or inward rolled tip, rarely flat, of variable shape, abscissing after flowering; stylopodium widening, with undulant-lobate margin; styles subulate above, sometimes thickened; mericarps dorsally inflated, with narrow margin; canals in furrows broad, full of resin, often fusing into single broad canal, rarely 2–3. Monocarpic herbs, with thick, robust, spongy stem; branches thickening at maturation; leaves early wilting, mostly with large lobules, covered with soft sparse hairs. Twenty species, mostly in the mountains of SW Asia. Most species have a tar-like odor.

Section 1. PALAEONARTHEX Korov., Monogr. (1947) 8. — Leaf lobules oblong-oval, more than 5 cm long.

Group 1. Pachycarpae Korov. l. c. — Fruit dorsally inflated, with narrow margin.

14. *F. conocaula* Korov., Monogr. (1947) 33. — Ic.: Korov., ibid., Table VIII, Figure 1.

Perennial; monocarpic plant; stem ca. 2 m high, 15 cm thick at base, distinctly conical, branching from middle to produce ovoid paniculate inflorescence; branches thick, crowded above, whorled; radical leaves smooth above, finely pubescent beneath, canescent, short-petioled, their blade ternate with large, 27 cm long, 7 cm wide, lanceolate or lanceolate-elliptic, sometimes deeply pinnatifid lobules, rounded-serrate near apex; cauline leaves reduced, with flat triangular sheath. Umbels variable, terminal of 16–50 rays, sessile, to 11 cm across, lateral 3–7, crowded on long pedicels; umbellets 15-flowered, with 10 small deciduous leaflets; calyx-teeth small, deciduous; petals yellow, oblong-oval, 1 mm long, with inward curved tip; stylopodium cup-shaped; stigmas thickened; mericarps flat oval, with narrow margin, 11 mm long, 7 mm wide; ribs acutely protruding; 1–2 canals per furrow, 8 toward commissure. Fr. May.

Mountain semideserts. — Centr. Asia: T. Sh. (Mogol-Tau). Endemic. Described from Mogol-Tau Mountain. Type in Tashkent.

15. *F. diversivittata* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestv. antrop. i etnogr. XXXIV, 2 (1882) 33. — *F. suaveolens* Aitch. et Hemsl. in Trans. Linn. Soc. London, III, 1 (1888) 69. — *F. Sintenisii* Wolff in Fedde, Repert. XIX (1924) 310. — Ic.: Aitch. et Hemsl. l. c. tab. 20–21; Korov., Monogr. (1947) Table VIII, Figure 2.

84 Perennial; stem to 150 cm high, inflated at nodes, branching from middle or below to produce broadly oval panicle; branches arcuately curved, lower alternate, upper whorled; leaves soft, soon wilting, glabrous above, hairy beneath, radical leaves on short strong petioles with ternate blade, its lobules to 15 cm long, 6 cm wide, elliptic or oblong-elliptic, decurrent, nearly entire, rarely rounded-dentate, sometimes deeply incised; cauline leaves with reduced blade and coriaceous, whitish, lanceolate sheath appressed to stem. Umbels vary, terminal of 15–20(30) rays to 8 cm across on very short pedicels, lateral on long pedicels, crowded in groups of 2–6; umbellets 15–(20-) flowered, with involucre of 10 membranous, deciduous, lanceolate leaflets; calyx-teeth triangular-lanceolate; petals yellow, oval, inward curved, 1–2 mm long; stylopodium widening, with raised edge; mericarps plano-compressed, oval, broad-margined, 10 mm long, 6 mm wide; ribs filiform; canals solitary in furrows, broad, 6 toward commissure. Fl. May, Fr. June.

Soft, herbaceous slopes in steppe belt. — Centr. Asia: T. Sh., Syr D., Pam.-Al., Mtn. Turkm. Gen. distr.: Iran. Described from Syr Darya and Zeravshan. Type in Leningrad.

16. *F. gigantea* B. Fedtsch. in Tr. Bot. muz. Akad. Nauk. I (1902) 135. — *F. gigas* K.-Pol. in Izv. Voron. obshch. estestvoisp. 1 (1925) 90. — Ic.: Korov., Monogr. (1947) Table IX, Figure 1.

Perennial; monocarpic plant; root thick, nearly ovoid; stem to 2 m high, to 10 cm thick, tapering, twice branching above to produce broad spreading panicle; branches thin, except for branches of second order, thickened at nodes, the latter in alternate pairs; leaves large, pale green, glabrous above, short-haired along nerves beneath, their blade ternate, sections simple- or bipinnatisect, lobules oblong-elliptic, with obliquely or shortly decurrent base, rounded-dentate to 30 cm long, 15 cm wide; cauline leaves with reduced blade, upper reduced to lanceolate, amplexicaul sheath appressed to stem. Umbels axillary only, of 8–15 rays, ca. 5–7 cm across, node becoming thickened; umbellets with 10–15 flowers, with involucre of 10 lanceolate-subulate, herbaceous leaflets; calyx-teeth small, triangular; petals oval, yellow, sometimes violet, inward curved, 1–3 mm long; stylopodium widening, with slightly raised margins; mericarps oval, plano-compressed, with narrow margin, as long as pedicels, 10 mm long, 5 mm wide; ribs filiform, slightly protruding; canals solitary in furrows, 2 toward commissure. Fl. June, Fr. August.

Soft, herbaceous mountain slopes in steppe belt, 2,400 m. — Centr. Asia: Pam.-Al. Endemic. Described from the Pyandzh River valley. Type in Leningrad.

17. *F. iliensis* Krasn. on label in Herbarium of the Edinburgh Botanical Garden (nom. nud.), described in Korov., Monogr. (1947) 33.

Perennial; monocarpic plant; stem thick, robust, ca. 1 m high, pale green, paniculately branching above; leaves soft, soon wilting, glabrous above, canescent beneath; radical leaves sturdy, short-petioled, their blade broad, tripinnatisect, lobules to 2–5 cm long, 1–1.5 cm wide, oblong, obliquely decurrent, deeply incised or parted into few entire sections. Umbels variable, central sessile, of 14 rays, 8–10 cm across, lateral in groups of three on long pedicels; umbellets 10–15 flowered, without involucre, with thickened node; calyx edentulate; petals pale-yellow, oval, flat, hairy outside, 2.5 mm long; mericarps plano-compressed, oval, with narrow margin, 12 mm long, 7 mm wide; ribs markedly protruding; canals in furrows, solitary, broad, inflated, 10–12 toward commissure. Fr. May.

Deserts. — Centr. Asia: Balkh. Endemic. Described from specimens collected between Taldykuduk and Kyzyl-Kum. Type in Leningrad.

Group 2. Platycarpae Korov. — Fruit plano-compressed, with broad margin.

18. *F. latifolia* Korov., Monogr. (1947) 34. — Ic.: Korov., *ibid.*, Table X, Figure 1.

Perennial; monocarpic plant; stem ca. 1 m high, strongly inflated at nodes, pale green, twice paniculately branching above; branches (except for upper) opposite, alternate; leaves soft, soon wilting, glabrous above, hairy along nerves beneath; radical leaves long-petioled, ternate, their segments divided into pinnately disposed, oblong-elliptic, decurrent lobules to 15 cm long, tapering

at base, evenly round-toothed; cauline leaves with obsolete blade, on elongate, narrow lanceolate sheaths. Umbels axillary only, of 4–8 rays, ca. 6 cm wide; umbellets 10–15-flowered, with involucre of 3–5 linear-lanceolate leaflets; calyx lacking; petals yellow, oval, glaucous outside, turned inward; stylopodium widening, flat, with lobate margin; ovary furrowed with protruding ribs; canals solitary in furrows, 6 toward commissure.

Slopes. — Centr. Asia: Pam.-Al. Endemic. Described from Kamchirak mountain pass (in Karategin Range). Type in Leningrad.

19. *F. inflata* Korov., Monogr. (1947) 35. — Ic.: Korov., *ibid.*, Table X, Figure 2.

Perennial; monocarpic plant; stem high, sturdy, markedly inflated at nodes, pale green, branching to produce spreading panicle above; branches thin, alternate; opposite, sometimes with reduced lateral branches; leaves soft, soon wilting, glabrous above, hairy along nerves beneath; radical leaves ternate-dissected into large, oblong-elliptic, shortly decurrent, rounded-serrate, ca. 20 cm long lobules tapering at base; cauline leaves with reduced blade on tapering, lanceolate, amplexicaul sheaths; umbels axillary only, of 10 rays, ca. 15 cm wide; umbellets 10–15(17)-flowered, with involucre of 5 linear, herbaceous leaflets; flowers unknown; mericarps flattened, oval, with broad pale margin, olive-colored, 19 mm long, 6 mm wide, about as long as pedicels; ribs filiform, hardly protruding; canals solitary in furrows, 2 toward commissure. Fr. July.

Rose gardens 1,840 m. — Centr. Asia: Pam.-Al. Endemic. Described from near Shuroabad. Type in Leningrad.

20. *F. jaeschkeana* Vatke in Ind. sem. Hort. Berol. Append. (1876) 2; Boiss. Fl. or. Suppl. 264. — *Peucedanum jaeschkeanum* Baill. Hist. pl. VII (1880) 185. — Ic.: Korov., Monogr. (1947) Table XI, Figures 2.

Monocarpic perennial, stem thick, robust, ca. 1 m high, reddish-brown, branching in upper third to produce rather dense broadly ovoid panicle; branches sturdy, reduced, mostly in groups of few branches; leaves soft, soon wilting, often glabrous above, hairy beneath; radical leaves broadly triangular, ternately dissected, their segments bipinnatisect into oblong, oblong-lanceolate or oblong-linear decurrent lobes, rounded at apex, incised and crenate, to 15 cm long, 5 cm wide; cauline leaves with reduced blade on oval-lanceolate, soft, amplexicaul sheath. Umbels variable, terminal sessile, subspherical, of 20–25 rays, to 16 cm across, lateral solitary or in pairs; umbellets 10–15-flowered, without involucre; calyx edentulate; petals yellow, flat, lanceolate, with curved apex, 2.5 mm long; stylopodium flat, with thickened margin, as wide as ovary; styles without thickened stigmas; mericarps plano-flattened, reddish-brown, oval or oblong-oval, sometimes distinctly tapering or notched at apex and base, 20–40 mm long, 10–22 mm wide, with widened margin; ribs filiform, hardly protruding; canals broad, solitary in furrows, 6 toward commissure, 4 at margins. Fl. May–June, Fr. June–July.

Herbaceous slopes in subalpine and shrub belt. — Centr. Asia: T. Sh., Pam.-Al. Gen. distr.: Iran (Afghanistan), Ind.-Him. Described from the Himalayas (Rotang gorge, 4,200–4,500 m). Type was in Berlin.

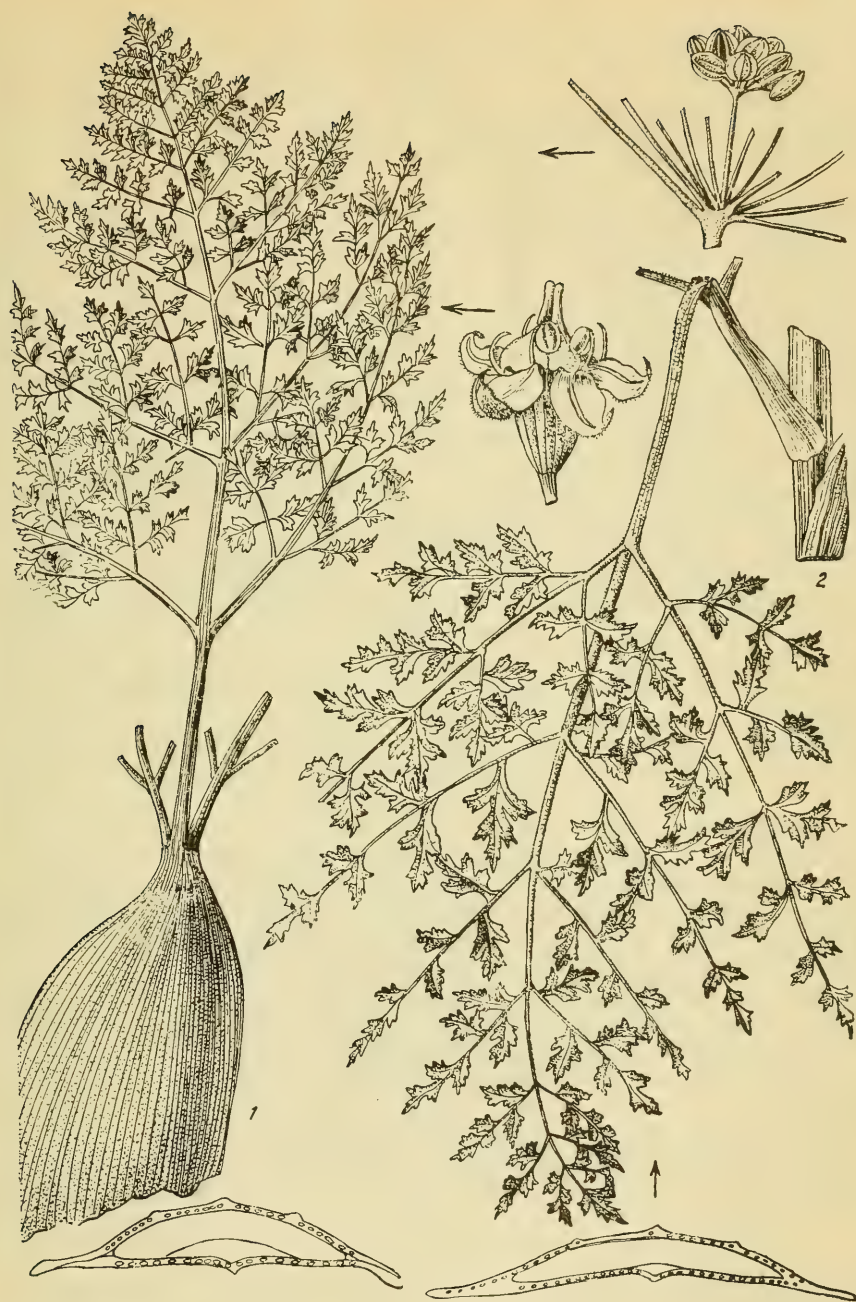


PLATE X. 1—*Ferula persica* Willd.; 2—*F. lehmannii* Boiss.

- 89 **Economic importance.** The ether extracted from the fruits contains 19% of a dark yellow resin and 3.5% essential oil (d-pinene (91%), cumic aldehyde (1.3%), azulene (5%)) (V. R. Berutskii. Kompleksnoe khimicheskoe issledovanie plodov *Ferula jaeschkeana* Vatke, 1937 (Complex Chemical Investigation of the Fruits of *Ferula jaeschkeana* Vatke, 1937)). The fresh roots contain 0.42–0.71% oil (Snegirev) of which 85% is pinene.

21. *F. foetidissima* Rgl. et Schmalh. in Tr. Bot. Sada. V (1878) 593 et in Gartenfl. XXVII (1878) 195. — *F. krjukovii* Korov. in Ind. sem. Hort. Bot. Univ. As. Med. (1927) No. 248. — Ic.: Rgl. et Schmalh. Gartenfl. XXVII, tab. 944; Korov., Monogr. (1947) Table XII, Figure 1.

Monocarpic perennial; stems ca. 1 m high, thick, sturdy, reddish-brown, branching from middle to produce oblong ovoid panicle; branches reduced, sturdy, upper in groups of few branches; leaves soft, soon wilting, glabrous above, canescent beneath; radical leaves tripinnatisect, with oblong-lanceolate, rounded-serrate lobules with rounded apex to 12 cm long, 4 cm wide, pinnatifid in cauline leaves into few sections; cauline leaves with reduced blade on lanceolate, obliquely sessile sheaths divergent from stem. Umbels variable, terminal sessile, subspherical, of 25–30 rays, ca. 16 cm across, with 1–4 lateral umbels; umbellets 20-flowered, without involucre; calyx-teeth triangular-oval, small; petals yellow, broadly oval with inward curved tip 1.5 mm long; stylopodium flat, with slightly thickened margin, as wide as ovary; mericarps plano-compressed, oval, with broad margin, light brown, 18 mm long, 11 mm wide, twice as long as pedicels; ribs filiform, distinctly protruding; canals solitary in furrows, 6 toward commissure, 4 at margin. Fl. May, Fr. June–July.

Stony slopes in mountain shrub belt. — Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from Centr. Asia. Type in Leningrad.

22. *F. kuhistanica* Korov., Monogr. (1947) 36.

- Monocarpic perennial; stem thick, sturdy, pale green, ca. 1 m high; leaves soft, soon wilting, glabrous above, hairy beneath, with sturdy, narrow petioles; lobules large, oblong-oval, decurrent entire. Umbels variable, terminal subsessile, of 25 rays, ca. 12 cm wide, rays thickening, lateral umbels on long pedicels, in clusters of three; umbellets 15-flowered, without involucre; calyx-teeth small, triangular; petals [not seen — ed.]; mericarps plano-compressed, elliptic, yellow, with broad margin, 20 mm long, 11 mm wide, about as long as diameter of pedicels; ribs filiform, slightly protruding; canals solitary in furrows, 2–4 toward commissure. Fr. August.
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Herbaceous slopes in steppe belt. — Centr. Asia: Pam.-Al. Endemic. Described from the Aman-Kutan River valley in the Zeravshan Range. Type in Tashkent.

Section 2. NEONARTHEX Korov., Monogr. (1947) 9. — Leaf lobules small, cleft or parted.

23. *F. gumosa* Boiss. Diagn. pl. nov. ser. 2, 2(1856) 92. — *F. galbaniflua* Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 99;

Boiss. Fl. or. II, 988. — *F. erubescens* Boiss. in Ann. Sc. Nat. Bot. sér. 3, 1 (1844) 316, ex parte. — *Peucedanum galbanifluum* Baill. Hist. pl. VII (1880) 185. — Ic.: Kohler's Mediz. Pfl. Atlas, II, 153; Korov., Ill. Monogr. (1947) Table XIII, Figure 1.

Monocarpic perennial; stem ca. 1 m high, pale green, cylindrical, branching to produce sparse, oblong-ovoid panicle, branches nearly all alternate, rather thin; leaves canescent, soft, soon wilting; radical leaves multipinnatisect into numerous small, 1–2 mm long, narrow-linear, obtuse, 2–3-partite lobules; cauline leaves with reduced blade and oblong-oval, amplexicaul sheath. Umbels variable, terminal sessile, of 5–8(15) rays, ca. 10 cm across, lateral 2, opposite; umbellets 10(20)-flowered, with involucre of unequal, membranous, deciduous leaflets; calyx-teeth small, triangular; petals pale yellow, flat, with inward curved tip, sparingly pubescent outside, 2 mm long; margin of stylopodium elevated; styles long, capitate; mericarps yellow, oblong-oval, inflated, with flat margin, 16 mm long, 8 mm wide, much longer than pedicels; ribs filiform, canals inflated, broad, 1–2 in furrow, 4 toward commissure. Fl. May, Fr. June.

Herbaceous slopes in steppe belt. — Centr. Asia: Mtn. Turkm. (Kopet Dag). Gen. distr.: Iran. Described from Iran. Type in Geneva.

Economic importance. The roots yield 2.84–3.78% essential oil containing d-copinene (80%), water-soluble aldehyde (3.6%), a phenol of unknown structure (R. Urinson) and up to 24% of a resin which was once used, as "galbanum," in the manufacture of plasters.

24. *F. badrakema* K.-Pol. in Bot. mat. gerb. Glavn. Bot. Sada. II. (1921) 62. — *F. galbaniflua* Aitch. in Trans. Linn. Soc. London Sec. ser. III, 1 (1888) 68, non Boiss. et Buhse (1872). — Ic.: Aitch l. c. tab. 15–18; Korov., Monogr. (1947) Table XIII, Figure 2.

Monocarpic perennial; stem ca. 1 m high, sturdy, thick, hollow, whitish, distinctly swollen at middle, conically tapering above, branching to produce 91 spherical panicle; branches sturdy, contracted, with membranous sheath; leaves canescent, soft, soon wilting; radical leaves short-petioled, broadly triangular, multipinnatisect into numerous narrowly linear, simple, or 2–3-fid, 1–2 mm long lobules; cauline leaves reduced to lanceolate, membranous, flat, early wilting sheaths; umbels variable, terminal subsessile, of 5–12(18) rays, ca. 10 cm across, lateral in clusters of 2–4; umbellets 10-flowered, without involucre; calyx-teeth inconspicuous; petals pale yellow, nearly flat, curved only at tip, sparingly pubescent, 2.5 mm long; stylopodium with elevated margin; styles long, stigmas capitate; mericarps flattened, oblong-oval, light brown, 20–22 mm long, 9 mm wide; ribs filiform; canals inflated, 1–2 per furrow, 6 toward commissure. Fl. April, Fr. May.

Sandy, herbaceous hills in semidesert mountain belt. — Centr. Asia: Mtn. Turkm. (Badkhyz). Gen. distr.: Iran. Described from Kushka. Type in Leningrad.

Economic importance. The roots contain a red-orange resin.

25. *F. teterrima* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 363. — Ic.: Korov., Monogr. (1947) Table XIV, Figure 1.

Perennial; stem thick, sturdy, deeply furrowed, ca. 2 m high, paniculately branching slightly above base; branches alternate, upper whorled; leaves

soft, soon wilting, canescent, lower with long petioles passing into sheath, their blade triangular-oval, multipinnatisect, into 10 mm long, lanceolate, cuneate lobules cleft into small lanceolate acute sections; cauline leaves with flat, wilting sheath. Umbels variable, terminal subsessile, of 15–23 rays, ca. 12 cm wide, lateral in whorls of 2–3; umbellets 12–20-flowered; flowers not seen; mericarps elliptic, plano-compressed, with narrow margin, 10–12 mm long; ribs sharply protruding, resembling keels; canals 1–2 per furrow, 6 toward commissure. Fr. June. (Plate XI, Figure 1.)

Semideserts. — Centr. Asia: Balkh. Gen. distr.: Sinkiang (Kuldja). Described from Sasyk Pastau. Type in Leningrad.

26. *F. krylovii* Korov. in Sistem. zametkakh po mater. gerb. Tomsk. univer. No. 2–3 (1934) 2; Kryl., Fl. Zap. Sib. VIII, 1995.

Perennial; stem thick, sturdy, ca. 1.5 m high, pale violet when mature; branches compressed above, bearing 2–5 umbels. All umbels fertile, the
92 terminal sessile, subspherical of 12–23 rays, ca. 12 cm across, the lateral on long thick pedicels, in groups of 2–3; umbellets 10–13-flowered; flowers not seen; mericarps yellowish, plano-compressed, oblong-oval, with narrow margin, 14–15 mm long, twice as long as pedicels, crowned by cup-shaped stylopodium; ribs filiform, protruding; canals 2, rarely 3, per furrow, 6 toward commissure. Fr. July.

Clayey-solonetzic steppe. — Centr. Asia: Balkh. Endemic. Described from near Buran village. Type in Tomsk.

27. *F. canescens* Ldb. Fl. Ross. II (1844) 302; Kryl., Fl. Zap. Sib. VIII, 1993. — *Peucedanum canescens* Ldb. Fl. alt. I (1829) 307. — Ic.: Ldb. Ic. pl. Fl. Ross. II, tab. 105; Korov., Monogr. (1947) Table XV, Figure 2.

Perennial; root cylindrical; stems 1, rarely 2, thin, twisted, 40 cm high, hairy below, glabrous above, corymbiformly branching from middle or lower; branches alternate, upper opposite; leaves soft, soon wilting, canescent, both surfaces covered with short hairs; radical leaves with short strong pedicels, their blade triangular, tripinnatisect into small, 5–10 mm long, oblong-lanceolate or oval, pinnatifid or dentate lobules with typically triangular, acute teeth; cauline leaves with obsolete blade, their sheaths herbaceous, oblong-lanceolate, more or less divergent from stem. Umbels variable, pediceled, terminal of 2–8, rarely to 12 rays, 3–6 cm across, lateral opposite; umbellets 10-flowered, with involucre of 10 linear-lanceolate, membranous leaflets as long as pedicels; calyx edentulate; petals reflexed, long persistent, pale yellow, oval, with short, obtuse, inward curved tip; stylopodium flat, margins slightly elevated, lobate; styles elongate; mericarps oblong-ellipsoid, with narrow whitish margin, 8–14 mm long, 3.5–6 mm wide; ribs protruding at angles, canals solitary, broad, 2 narrow canals toward commissure. Fl. June, Fr. July.

Clayey, solonetzic semideserts, gypsiferous and stony slopes. — Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from Arkaul. Type in Leningrad.

28. *F. syreitschikovii* K.-Pol. in Bot. mat. gerb. Glavn. Bot. Sada, III (1922) 71. — *F. puberula* Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 1 (1866) 323, non Boiss. (1860); Kryl., Fl. Zap. Sib. VIII, 1994. —

Pastinaca Olgae Rgl. et Schmalh. in Izv. obshch. lyubit. estestv. antrop. i etnogr. XXXIV (1882) 37, non *Ferula* Olgae Rgl. et Schmalh. (1882). — Ic.: Korov., Monogr. Table XVI, Figure 2.

93 Perennial; root cylindrical, its neck covered with bast-like fibers; stem 20–30 cm high, thin, twisted, corymbiformly branching from middle or higher, densely covered with short hairs; branches alternate; leaves hairy on both sides, soon wilting; radical leaves rhombic, bi- or tripinnatisect with blade, sessile on sheaths, their lobules nearly oval, to 20 mm long, pinnatifid into small, oval, angular-dentate sections; cauline leaves nearly bladeless; upper leaves reduced to lanceolate, herbaceous sheaths. Umbels variable, pediceled, terminal of 8–12 (rarely to 20) rays, 4–6 cm across, lateral opposite; umbellets 12–25-flowered, with involucre of 10 lanceolate, herbaceous, pubescent, persistent leaflets; calyx of triangular-lanceolate teeth; petals yellow, pale, obovate, acuminate, with inward curved tip, ciliate-hairy outside, reflexed, long persistent, 1 mm long; stylopodium flattened-conical, with expanded, undulant margin; styles thickened, short; mericarps ellipsoid, inflated, with narrow pale margin, 7.5 mm long, 4 mm wide, twice as long as pedicels; ribs filiform; canals solitary in furrows, broad, inflated, 2 narrow canals toward commissure. Fl. May, Fr. June.

Sandy-clayey, gypsiferous deserts, saline outcrops in lower mountain belt. — Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from the Lake Balkhash area. Type in Leningrad.

Subgenus 4. *Euferula* (Boiss.) Korov., Monogr. (1947) 9. — Sect. *Euferula* Boiss. Fl. or. II (1872) 983. — Petals yellow, small, elliptic, attenuate or acuminate or with inward curved tip, depressed along median line, soon deciduous; stylopodium short-conical, with expanded, undulant margin; styles subulate, hardly thickened at apex; mericarps distinctly inflated dorsally, with narrow margin; canals 2–3, rarely 4 per furrow, interrupted. Polycarpic or monocarpic, often glabrous herbs; stems robust, cylindrical, sometimes stems few; leaves thin, withering, variously shaped. Twenty-six species in the distribution area of the genus in mountains and deserts with typical tarry odor.

Section 1. *PHYLLITES* Korov., Monogr. (1947) 9. — Leaf lobules glabrous or subglabrous (except *F. linczevskyi*), thin; the mericarps contain abundant resin; canals superficial.

29. *F. kokanica* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestv. antrop. i etnogr. XXXIV, 2 (1882) 33. — *F. schugnanica* B. Fedtsch. in Tr. Bot. muz. Akad. Nauk. 1 (1902) 136. — Ic.: Korov., Monogr. (1947) Table XVII, Figure 1.

94 Monocarpic perennial; root thickened; stem moderately thick, ca. 1 m high, branching in upper part to produce ovoid panicle; branches in whorls; leaves pale, soon wilting, hairy beneath; radical leaves ternate, long-petioled, their segments pinnatisect into oblong-elliptic, obliquely decurrent lobules, rounded, sometimes deeply cleft, acutely serrate, 7–9 cm long, 2–3 cm wide;

only the lower cauline leaves with blade, the upper reduced to oval, not quite amplexicaul sheaths. Umbels variable, the terminal sessile, of 8–16 rays, 5–8 cm across, the lateral 1–2 sessile on pedicels, overtopping terminal umbel; umbellets 10–15(25)-flowered, with deciduous involucre; calyx short-toothed; petals oblong-oval, yellow, inward rolled, 2 mm long; stylopodium flattened-conical, with wide flat margin; mericarps yellow, inflated, ovoid, 10 mm long, 5 mm wide, with filiform ribs; canals inflated, superficial, 4–5 per furrow, 10 toward commissure. Fl. May–June, Fr. June–July.

Stony slopes in shrub belt, 2,400 m. — Centr. Asia: Pam.-Al. Gen. distr.: Ind.-Him. Described from Isfairam River. Type in Leningrad.

30. *F. tuberifera* Korov., Monogr. (1947) 43. — Ic.: Korov., *ibid.*, Table XVII, Figure 2.

Perennial; root tuberiform; stem pale green, medium-sized, ca. 50 cm high, swollen at nodes, branching from middle; lower branches alternate, upper whorled; radical leaves short-petioled, their blade rhombic, tri-pinnatisect, into decurrent, obovate, pinnatifid and acutely toothed lobules, glabrous above, sparsely hairy along nerves and margins beneath, 1.5–2 cm long, terminal lobules much larger; cauline leaves with reduced blade on chartaceous, oblong, flat sheaths. Umbels variable, terminal subsessile, of 7–13 rays, ca. 5–8 cm across, lateral in groups of 2–3, more or less crowded; umbellets 10–15-flowered, pedicels unequal; involucre absent; calyx edentulate; petals yellow, oblong-oval, convolute, 1.5 mm long; mericarps ovoid or oblong-ovoid, inflated, pale yellow, with narrow margin, 14 mm long, 7 mm wide; ribs thin, hardly protruding; canals 5–7 per furrow, 10 toward commissure. Fl. May, Fr. June.

Stony slopes in Central Asian juniper belt. — Centr. Asia: Pam.-Al. (Kugitang and Chul'bair). Endemic. Described from Kugitang. Type in Tashkent.

31. *F. foliosa* Lipsky in Sched. ad Herb. Inst. bot. Ac. Sc. URSS; Korov., Monogr. (1947) 43. — Ic.: Korov., *ibid.*, Table XVIII, Figure 1.

95 Perennial; root thickened, ovoid; stem to 2 m high, ca. 4 cm thick, branching from middle to produce oblong-pyramidal panicle; with branches in few whorls in upper part; leaves soft, soon wilting; radical leaves long-petioled, their blade wide, pinnatisect into oblong-oval, 15 mm long, pinnatifid or unequally acutely toothed lobules; cauline leaves with oval-lanceolate sheaths. Umbels variable, subspherical, terminal of 18–23 rays, 8–18, 6 cm across, lateral 1–3 at or near base of terminal umbel, long-pedicel; umbellets 10–15-flowered, without involucre or with few membranous leaflets; flowers not seen; mericarps pale brown, ovoid or oblong-ovoid, slightly inflated, with narrow margin, 8–12 mm long, 5 mm wide; canals solitary in furrows, broad, superficial, 6–8 toward commissure. Fr. July.

Walnut forests. — Centr. Asia: T. Sh. (Fergana Range). Endemic. Described from Fergana Range. Type in Leningrad.

32. *F. samarkandica* Korov. in Ind. sem. Hort. Bot. Univ. As. Med. (1931) No. 600 (nom. nud.); Korov., Monogr. (1947) 44. — Ic.: Korov., *ibid.*, Table XVIII, Figure 2.

Monocarpic perennial; root producing few thickened lateral branches; stem thin, not more than 1 m high, yellowish-green, branching from middle to produce oblong-ovoid panicle; leaves soft, soon wilting, glabrous above, scabrous-hairy beneath; radical leaves tripinnatisect into oval, ca. 10 mm long, cleft and acutely toothed lobules; cauline leaves with reduced blade, upper leaves reduced to oval-lanceolate, slightly inflated sheaths. Umbels variable, terminal sessile, often of 8–14 (rarely 20) rays, ca. 5–7 cm across, lateral in groups of 2–3; umbellets 10–15-flowered, involucre of few deciduous membranous leaflets; calyx of triangular teeth; petals acuminate, yellow, with depressed midrib, curved inward; stylopodium widening, flat, with thickened margin; stigmas thickened; mericarps olive-colored, ovoid, inflated, with narrow margin, 7–10 mm long; ribs filiform, obtusely protruding; canals 3–4 per furrow, 6 toward commissure. Fl. May, Fr. June.

Stony slopes in shrub belt. — Centr. Asia: T. Sh., Pam.-Al., Mtn. Turkm. Endemic. Described from Aktash. Type in Tashkent.

33. *F. kelleri* K.-Pol. in Bot. mat. Glavn. Bot. Sada, III (1922) 171. — *F. alata* Lipsky in Sched. ad Herb. Inst. bot. Ac. Sc. URSS. — Ic.: Korov., Monogr. (1947) Table XIX, Figure 2.

96 Perennial; root fusiformly thickened, polycarpic; stem pale green, rather thick, ca. 1 m high, paniculately branching from middle or above; branches in whorls, thin, elongate; leaves soft, not wilting rapidly, glabrous above, slightly scabrous and hairy along nerves beneath; radical leaves triangular-oval, pinnatisect into oval, 10 mm long lobules, cleft-laciniate or deeply pinnatipartite into lanceolate sections; cauline leaves with reduced blade on oval-lanceolate sheaths. Umbels variable, terminal sessile, of 10–18 rays, ca. 6 cm across, lateral umbels 1–2, on long pedicels; umbellets 10–15-flowered, with involucre of few squamiform leaflets; calyx-teeth triangular; petals yellow, oblong, with inward curved tip; stylopodium with elevated, thickened margins; styles elongate; stigmas not thickened; mericarps brown, ovoid, inflated, with narrow whitish margin, 8 mm long, 6 mm wide; ribs filiform, slightly protruding; canals inflated, unequal, often 3 per furrow, 6–8 toward commissure. Fl. June–July, Fr. July–August.

Shrubby formations in herbaceous slopes. — Centr. Asia: T. Sh., Pam.-Al. (Alai Range). Endemic. Described from Tien Shan. Type in Leningrad.

34. *F. leiophylla* (K.-Pol.) Korov., Monogr. (1947) 44. — *F. microloba* var. *leiophylla* K.-Pol. in Sched. ad Herb. Inst. bot. Ac. Sc. URSS. — Ic.: Korov., *ibid.*, Table XX, Figure 2.

Monocarpic perennial; with fusiformly thickened root; stem thin, slightly branching above, ca. 40 cm high; branches alternate and opposite; leaves soon wilting, smooth, radical with slightly scabrous petioles and oval-triangular blade, tripinnatisect into oblong-oval, deeply pinnatifid, 10 mm long lobules; cauline leaves on soft lanceolate sheaths. Umbels variable, terminal of 3–6 rays, 3–5 cm across, lateral on pedicels from near its base; umbellets 5–8-flowered, with involucre of 5 membranous lanceolate leaflets; calyx-teeth triangular; petals yellow, oblong-lanceolate, with depressed midrib; mericarps pale yellow, flat, with narrow margin, 5 mm long, 3.5 mm wide; ribs filiform; canals broad, 2–3 per furrow, 6–8 toward commissure. Fl. May, Fr. June.

(97)

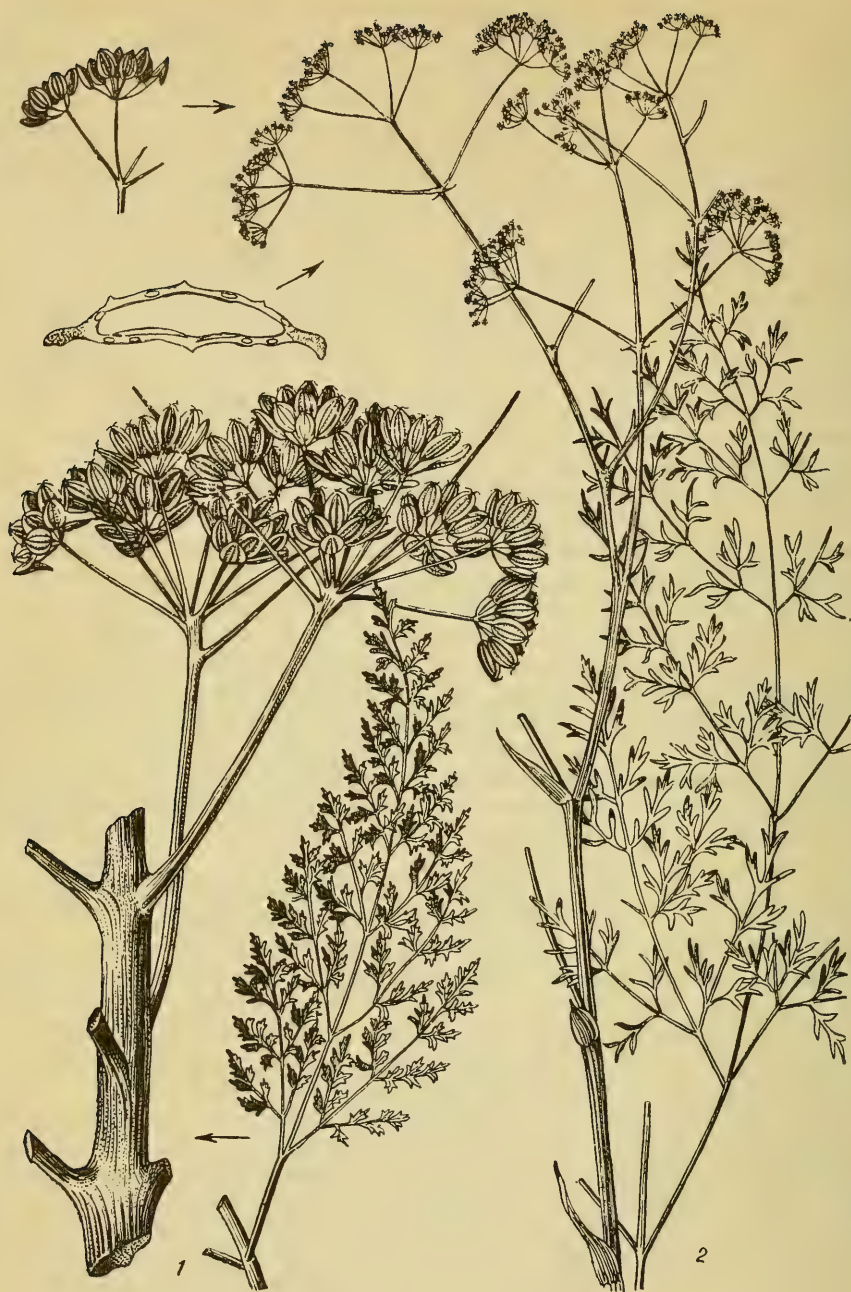


PLATE XI. 1 — *Ferula teterrima* Kar. et Kir.; 2 — *F. gracilis* Ldb.

Sands. — Centr. Asia: Balkh. Endemic. Described from the Lake Balkhash area. Type in Leningrad.

35. *F. subtilis* Korov., Monogr. (1947) 44. — Ic.: Korov., *ibid.*, Table XX, Figure 1.

Perennial; root fusiform; stem thin, not higher than 40 cm, smooth, violet, corymbiformly branching from middle; branches alternate; leaves pale green, soft, soon wilting; radical leaves on short pedicels passing into sheath, with triangular, tripinnatisect blade, with subsessile sections and small, oblong, dentate, to 4 mm long lobules with slightly downy margins; cauline leaves reduced to lanceolate soft sheaths. Umbels pediceled, variable, central of 3–8 rays, ca. 3 cm across, lateral opposite; umbellets 5–10-flowered, without involucre or with involucre of few deciduous leaflets; calyx edentulate; petals yellow, oblong-oval with depressed midrib and curved at tip, 1 mm long; stylopodium flattened-conical, widening with lobate elevated margin; mericarps (in flower) obovoid; ribs inflated; canals broad, solitary in furrows, 6 toward commissure. Fr. June.

Stony slopes. — Centr. Asia: Syr D. (Fergana valley). Endemic. Described from Fergana. Type in Leningrad.

36. *F. nevskii* Korov. in Tr. Bot. Inst. AN SSSR, ser. I, IV (1937) 270. — Ic.: Korov., Monogr. (1947) Table XXI, Figure 1.

Perennial; stem ca. 1 m high, branching in panicle from middle or above to produce panicle; branches and part of leaves violet at fruiting; leaves pale green, not wilting early, with scabrous-hairy rhachis, 4–5-pinnatisect into oval, 2 cm long, cleft and acutely toothed decurrent lobules; cauline leaves not seen. Umbels variable, terminal subsessile, of 8–9(13) rays, to 12 cm across, lateral of 1–5 rays on long pedicels, both types fertile; umbellets 15-flowered, their node thickened at fruiting, involucre of few chartaceous deciduous leaflets; calyx-teeth triangular, persistent; petals yellow, oval-lanceolate, tapering toward apex, inward curved with concave midrib, 1 mm long; stylopodium with elevated margins; styles elongate, stigmas slightly thickened; mericarps yellow, ellipsoid, acute at both ends, inflated, with narrow margin, 14–15 mm long; ribs filiform, protruding; canals 5 per furrow, occupying entire pericarp, 10 toward commissure. Fr. June–July.

Central Asian juniper forests. — Centr. Asia: Pam.-Al. (Kugitang). Endemic. Described from Kugitang. Type in Leningrad.

37. *F. linczevskii* Korov., Monogr. (1947) 45. — Ic.: Korov., *ibid.*, Table XXI, Figure 2.

Perennial; stem thick, ca. 1 m high, paniculately branching above; branches gathered in clusters; leaves not wilting rapidly, canescent, their blade wide, multipinnatisect into numerous small linear obtuse lobules; cauline leaves not seen. Umbels variable, terminal sessile, of 10 rays, 100 spherical, ca. 10 cm across, with thickening rays, lateral umbels single, long-pediceled; umbellets 15–20-flowered, without involucre; flowers not seen; mericarps obovoid with acute apex, inflated, with very narrow margin, 16 mm long, 10 mm wide; ribs inconspicuous; canals numerous, protruding like striae, none toward commissure. Fr. September.

Stony slopes in subalpine belt. — Centr. Asia: Pam.-Al. Endemic. Described from Kugi-Frush Mountain. Type in Leningrad.

Section 2. ANATRICHES Korov., Monogr. (1947) 9. — Leaf lobules elongate, narrow, linear-lanceolate, sometimes almost reduced to midrib.

38. *F. equisetacea* K.-Pol. in Bot. mat gerb. Glavn. Bot. Sada, II (1921) 65. — *F. equisetifolia* K.-Pol. in Byull. Obshch. estestvoisp. pri Voronezhsk. univ. (1925) 92. — Ic.: Korov., Monogr. (1947) Table XXII, Figure 1.

Perennial; root thick, fusiform, its neck densely covered with fibers; stem single, robust, ca. 1 m high, branching into panicle above; branches few, in whorls; leaves smooth, rather persistent, coriaceous, stiff when dry, radical leaves with short sturdy petioles and triangular blade, spreading, ternate, segments multi-(4-)pinnatisect, like petioles gradually passing into filiform, semirounded, acute, erect, glaucescent, to 15 cm long terminal sections; cauline leaves smaller with herbaceous, oblong-lanceolate sheaths. Umbels variable, terminal on short pedicel, of 8–15 rays, 12–20 cm across, lateral in groups of 2–5, on long pedicels; umbellets 10–15-flowered, without involucre; flowers on long, unequal pedicels; calyx-teeth short; petals yellow, oval-lanceolate, acuminate, curved inward; stylopodium thick, concave with lobate margin; mericarps ellipsoid, glaucescent, inflated, with sharply protruding filiform ribs, 15 mm long, 8 mm wide; canals narrow, 3 per furrow, 10 toward commissure, apart from numerous superficial canals. Fl. June, Fr. July–August.

Stony slopes, shrub belt, ca. 1,000 m. — Centr. Asia: Pam.-Al. Endemic. Described from Gissar Range. Type in Leningrad.

39. *F. koso-poljanskyi* Korov., Monogr. (1947) 46. — Ic.: Korov., *ibid.*, Table XXII, Figure 2.

Perennial; stem high, well-proportioned, glaucescent, spreading-branching in upper part; lower branches alternate, upper in whorls of few branches; 101 leaves glabrous, not wilting early; radical leaves petioled, ternately dissected, primary sections multipinnatisect into filiform, revolute, subcylindrical, slightly curved, 6 cm long lobules furrowed below, cauline leaves not seen. Umbels variable, terminal sessile, subspherical, of 17–27 rays, ca. 8 cm across, lateral on long sturdy pedicels, in groups of 2–3, of which some with fruit, others sterile; umbellets 10–15-flowered, without involucre; mericarps elliptic, as long as pedicels, plano-compressed, angular along dorsal ribs, with broad margin, 15 mm long, 6–7 mm wide; canals 3 per furrow, 6–8 toward commissure. Fr. July.

Shrubby formations, 1,000 m. — Centr. Asia: Pam.-Al. Endemic. Described from the Pyandzh River valley. Type in Leningrad.

40. *F. lipskyi* Korov., Monogr. (1947) 46. — Ic.: Korov., *ibid.*, Table XXIII, Figure 2.

Perennial; root thick, cylindrical, its neck covered with fibers; stem single, robust, not higher than 0.5 m, cylindrical, deeply furrowed, branching from middle or below to produce dense, broadly ovoid or spherical panicle, lower branches alternate, upper whorled; leaves glaucous, glabrous, soon wilting, with robust, thick, divaricate, whitish rhachises; radical leaves with firm, reduced petioles, their blade triangular, many times (6–7) ternately dissected into straight filiform, subrounded, divaricate, to 6 cm long lobules;

cauline leaves smaller, with coriaceous, amplexicaul, nearly oval, declinate sheaths. Umbels variable, terminal on short pedicel, of 8–14 rays, to 15 cm across, spherical, fertile, lateral on long pedicels, single or approximate in pairs; umbellets 10-flowered without involucre; pedicels of unequal length; calyx-teeth short; petals yellow, broadly lanceolate, twisted, acuminate, with 3 prominent nerves, 1.5 mm long; stylopodium widening, nearly flat with lobed margin; mericarps plano-compressed, elliptic, with broad pale margin, glaucous, 12–15 mm long, 6–7 mm wide, twice or half as long as fruit stalks; ribs filiform, sharply protruding; canals very narrow, 3–4 per furrow, 12 toward commissure, with some additional superficial canals. Fl. May, Fr. June.

Dry, clayey slopes. — Centr. Asia; Syr D. Endemic. Described from Margelan and Dzhahal-Abad. Type in Leningrad.

41. *F. fedtschenkoana* K.-Pol. in Bot. mat. gerb. Glavn. Bot. Sada, II (1921) 66. — Ic.: Korov., Monogr. (1947) Table XXIV, Figure 1.

102 Perennial; root fusiform, thickened neck covered with fibers of dead radical leaves; stems single or few, thin, often violet, corymbiformly branching at apex with alternate branches, upper branches opposite; leaves glaucescent, glabrous, soft, radical with long thin petioles, their triangular-oval blade multi-(5-)pinnatisect into numerous 10–12 mm long, divaricate lobules; cauline leaves reduced to small, narrowly lanceolate sheaths. Umbels variable, terminal of 4–8 rays, 4–10 cm across, lateral in pairs at base of central umbel or lacking; umbellets 10-flowered, without involucre or with involucre of few squamiform, deciduous leaflets; flowers yellow, on long thin pedicels; calyx short-toothed; petals oval, with shortly acuminate curved tip, 1.4 mm long; mericarps (in ovary) oblong-oval; canals 2–3 per furrow, 10 toward commissure. Fl. June. (Plate XIII, Figure 2.)

In juniper belt. — Centr. Asia; Pam.-Al. Endemic. Described from Zeravshan Range. Type in Leningrad.

Subgenus 5. *Peucedanoides* (Boiss.) Korov., Monogr. (1947) 9. — Section *Peucedanoides* Boiss. Fl. or. II (1872) 983. — Flowers and fruit as in preceding section, but canals in furrows solitary, rarely 3. Polycarpic, often multicapitate herbs; leaves of a compact consistency, xeromorphic, persistent, stiff when dry, often scabrous, covered with short papillae. Sixty-four markedly variable species widespread throughout entire distribution area, particularly in mountains.

Section 1. *XERONARTEX* Korov. l.c. — Leaves thickish, stiff when dry, not wilting early, usually parted into small lobules; stems usually few, forming loose, cespitose shrubs; fruit inflated, with abundant resins.

Group 1. *Ceratophyllae* Korov. l.c. — Plant entirely glabrous, rarely slightly scabrous, glaucous; umbels vary in position; canals solitary in valliculae (with exception of *F. prangifolia* and *F. grigorjevii*).

42. *F. grigorjevii* B. Fedtsch. in Tr. Bot. muz. Akad. Nauk, I (1902) 137. — Ic.: Korov., Monogr. (1947) Table XXV, Figure 1.

Perennial; root cylindrical, thick, its neck covered with fibers of last year's leaves; stem thick, more than 1 m high, branching at apex to produce broadly spreading panicle; leaves glaucous, coriaceous, rather persistent; radical leaves with long firm petioles bearing broad, loose, ternately dissected blade, its primary segments multipinnatisect into small, opposite
103 sections clustered to produce bundles of small linear lobules; cauline leaves smaller, their sheaths oval, slightly swollen, faintly violet outside, white inside. Umbels variable, terminal on reduced pedicels, of 20–25 rays, 6–10 cm across, lateral 3–6, on long pedicels; umbellets 15(18-) flowered, with involucre of few filiform, deciduous leaflets; calyx-teeth triangular-lanceolate; petals yellow, oval, with short, acute, inward curved tip 1.3 mm long; stylopodium ampullaceous; styles elongate, deflexed, stigmas slightly thickened; mericarps oblong-elliptic, plano-compressed, with narrow margin, 10–15 mm long, 5–8 mm wide; ribs filiform, slightly protruding; canals narrow, 3 per furrow, 6 toward commissure. Fl. June, Fr. July–August.

Subalpine belt on stony slopes, to 3,350 m. — Centr. Asia: Pam.-Al. Endemic. Described from the Toguz-Bulak and Gunt rivers. Type in Leningrad.

43. *F. prangifolia* Korov. in Ind. sem. Hort. Bot. Univ. As. Med. (1927) No. 253, nom. nud.; Korov., Monogr. (1947) 53. — Ic.: Korov., ibid., Table XXVI, Figure 1.

Perennial; dark green, glabrous, rarely slightly scabrous plant; stem ca. 1 m high, 2 cm thick, paniculately branching, with few whorled branches above, lower branches alternate; leaves shiny, often turning black; radical leaves petioled, their blade triangular-oval, rather massive owing to numerous small multipinnatisect, 2 mm long, filiform, erect, divaricate, acute, revolute lobules; cauline leaves with reduced blade on oval-lanceolate, coriaceous, not amplexicaul sheaths. Umbels variable, terminal sessile, of 3–10(15) rays, 12 cm across, lateral in whorls of 3, on long pedicels; partly fertile calyx-teeth small; petals yellow, oval, depressed along midrib, acuminate, curved inward, 1.5 mm long; stylopodium ampullaceous; styles elongate; mericarps elliptic, plano-compressed, broad-margined, 14 mm long, 7–9 mm wide; ribs protruding at angles; canals of various sizes, 3 per furrow, 6–8 toward commissure, 4 along margins of mericarp. Fl. May, Fr. June.

Stony slopes in forest belt. — Centr. Asia: T. Sh. (W.). Endemic. Described from the Chirchik River valley. Type in Tashkent.

44. *F. minkwitzae* Korov., Monogr. (1947) 53. — Ic.: Korov., ibid., Table XXVII, Figure 2.

Perennial; glaucescent, glabrous plant; stem thin, ca. 0.5 m high, weakly
104 branching at apex; leaves persistent, with scattered stiff hairs; radical leaves with short petioles dilated at base, their blade sparse, ternate, segments tripinnatisect into small, fleshy, truncate, 5 mm long lobules acutely incised at apex; cauline leaves with oval-lanceolate, swollen, coriaceous sheaths. Umbels variable, terminal subsessile, of 7–14 rays, ca. 5 cm across, lateral 1–2, on long pedicels; umbellets 10-flowered; calyx-teeth small, chartaceous; petals yellow, oval, with attenuate, obtuse, inward curved tip, 1 mm long; stylopodium flattened-conical with lobed margin; mericarps



PLATE XII. 1 — *Ferula nuda* Spreng.; 2 — *F. potaninii* Korov.

ovoid, dorsally inflated, ribbed, with narrow margin; canals solitary in furrows, 2 toward commissure. May-June.

Stony slopes. — Centr. Asia: T. Sh. Endemic. Described from Ichkele-Tau Mountains. Type in Leningrad.

45. *F. pachyphylla* Korov., Monogr. (1947) 54. — Ic.: Korov., *ibid.*, Table XXVIII, Figure 2.

Perennial; glaucous, glabrous plant, (root) neck branching, covered with fibrous remnants of leaves; stems few, thin, sturdy, ca. 1 m high, branching from middle to produce oblong-ovoid panicle, lower branches alternate, upper whorled; leaves persistent, thickish; radical leaves with long petioles, their oval-triangular blade ternately dissected, with 4 additional segments where branching; sections of first order multipinnatisect into numerous, small, linear, 2 mm long, obtuse lobules; cauline leaves with reduced blade and oval-lanceolate, coriaceous sheaths. Umbels variable, terminal subsessile, of 6-12 rays, ca. 4-7 cm across, lateral 2-3, on long pedicels; umbellets 6-12-flowered, without involucre; calyx edentulate; petals yellow, oval, broadening at apex, curved inward, 1.5 mm long; stylopodium ampullaceous; mericarps (when young) oblong, glaucous; canals broad, solitary in furrows, 6 toward commissure. Fl. May, Fr. June.

Stony slopes. — Centr. Asia: T. Sh. Endemic. Described from Kara-Tau Range. Type in Tashkent.

46. *F. tschimganica* Lipsky in sched. ad Herb. Inst. bot. Ac. Sc. URSS; Korov., Monogr. (1947) 54. — Ic.: Korov., *ibid.*, Table XXIX, Figure 1.

107 Perennial; glaucous, glabrous plant; (root) neck branching, covered with numerous fibers; stems many, thin, ca. 0.5 m high, paniculately branching above, producing loose tufts together with sterile rosettes; leaves coriaceous, persistent, ternate, their triangular blade 3-pinnatisect into linear, apically broadening, cleft and acutely toothed, 10-15 mm long lobules; cauline leaves smaller, upper reduced to oval coriaceous sheath. Umbels variable, terminal sessile or subsessile, of 4-10(18) rays, ca. 5 cm across, lateral 1-2, on long pedicels; umbellets 1-15-flowered, with involucre of squamiform leaflets; calyx-teeth small; petals yellow, oval, obtuse, inward curved, 1.5 mm long; stylopodium flattened-conical, with thickened margin; styles slightly thickened above; mericarps oblong-ovoid, inflated, with narrow margin, 12 mm long, 5.5 mm wide; ribs filiform, prominent; canals broad, swollen, solitary in furrows, 6 toward commissure. Fl. June, Fr. July.

Stony localities in subalpine belt. — Centr. Asia: T. Sh. (W.), Pam.-Al. Endemic. Described from Chimgan. Type in Leningrad.

47. *F. ceratophylla* Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 595. — Ic.: Korov., Monogr. (1947) Table XXIX, Figure 2.

Perennial; glaucous, glabrous plant; (root) neck branching, densely covered with fibers; stems thin, ca. 1 m high, branching from middle to produce oblong-ovoid panicle, upper branches in small groups; leaves coriaceous, persistent, ternate, with triangular, tripinnatisect blade; lobules linear, canaliculate, sessile, with incised, acutely toothed, broadened apex; cauline leaves with reduced blade on inflated oval-lanceolate, coriaceous sheath. Umbels variable, terminal on short pedicels, of 5-10(15) rays, 1-3 cm across, lateral

single, on long pedicel; umbellets 7–10(15)-flowered; calyx edentulate; petals yellow, obovate, tapering at apex, obtuse, inward curved, 1.5 mm long; stylopodium calyciform; with elevated margin, styles elongate, slightly thickened at apex; mericarps oblong-ovoid, inflated, twice as long as pedicels, with narrow margin, 11 mm long, 6 mm wide; ribs filiform, slightly protruding; canals medium-sized, solitary in furrows, 6 toward commissure. Fl. June, Fr. July.

Stony slopes in mountain-steppe belt. — Centr. Asia: T. Sh. Endemic. Described from Kara-Tau Mountains (Kul'chek and Kara-Chokla). Type in Leningrad.

48. *F. karategina* Lipsky in Sched. ad Herb. Fl. As. Med. X (1926) 13. — Ic.: Korov., Monogr. (1947) Table XXV, Figure 2.

108 Perennial; glaucous, completely glabrous plant; stem thin, robust, barely 0.5 m high, branching above to produce sparse corymbiform panicle, lower branches alternate, upper whorled; leaves thickish; radical leaves with long petioles, their triangular blade multipinnatisect into small, 5 mm long, linear-lanceolate, acute, dentate lobules; cauline leaves with reduced blade on lanceolate, coriaceous sheath. Umbels variable, terminal subsessile, of 5–10 rays, ca. 6 cm across, lateral opposite on long pedicels; umbellets 10-flowered, with involucre of squamiform leaflets; calyx-teeth small; petals yellow, lanceolate, with thickened midrib, acute, inward curved, 0.8 mm long; mericarps 8 mm long, 6 mm wide, ellipsoid or spherical-ellipsoid, dorsally inflated, angled along ribs; canals broad, solitary in furrows, 4 toward commissure. Fl. July, Fr. August.

Slopes in subalpine belt. — Centr. Asia: Pam.-Al. Endemic. Described from Karategin. Type in Leningrad.

49. *F. nuda* Spreng. Umbell. sp. (1818) 81; Ldb. Fl. Ross. II, 303; Shmal'g., Fl. I, 406. — ? *F. pumila* Pall. ex Schult. Syst. VI (1820) 598. — Ic.: Spreng. l. c. tab. 7, f. 15; Voron. in Fl. Yugo-Vost. V, Figure 538; Korov., Monogr. (1947) Table XXX, Figure 1.

Perennial; root cylindrical, its neck densely enveloped by straight fibers; stem thin, 15–30 cm high, glaucous, twisted, spreading, corymbiformly branching; branches alternate; leaves smooth, sometimes with slightly scabrous margin, persistent; radical leaves with short petioles passing into sheath, their rhombic blade multi(4-)-pinnatisect into small, thickish, entire or tripartite, narrowly lanceolate, 3 mm long, acute lobules; cauline leaves with reduced blade on stiff, lanceolate sheath. Umbels axillary, of 10–15 slightly curved rays, to 7 cm across, umbellets 15-flowered; involucre of 2–8 squamiform leaflets or absent; calyx-teeth obscure; petals oblong-oval, obtuse, convolute; stylopodium flattened-conical, surrounded by thickened disk; styles straight; mericarps glaucous, elliptic, plano-compressed, with narrow margin, twice as long as pedicels, 6 mm long; ribs filiform; canals narrow, solitary in furrows, 2 toward commissure. Fl. May, Fr. June. (Plate XII, Figure 1.)

Clayey, saline semideserts and deserts. — European part: L. V.; W. Siberia: U. Tob. (Mugodzhary, Orsk, and others); Centr. Asia: Ar.-Casp. Endemic. Described after specimens grown from seeds collected by Pallas. Type in Berlin.

50. *F. potaninii* Korov. ex Pavlov, Fl. Tsentr. Kazakhst. II (1935) 532; Korov., Monogr. (1947) 56. — Ic.: Korov., ibid., Table XXX, Figure 2.

- 109 Perennial; stem thin, twisted above, ca. 30–40 cm high, slightly thickened at nodes, corymbiformly branching in upper part, lower branches alternate, upper in groups of 3; leaves glaucescent, scabrous on both surfaces, persistent; radical leaves with rhombic blade on short petioles dilated to sheath; primary segments subsessile, bipinnatisect into oval, 10 mm long sections, these in turn pinnatipartite into small, oval, acute, entire or slightly dentate overlapping lobules; cauline leaves with reduced blade on stiff, lanceolate-oval, divergent sheaths; umbels axillary, of 15 rays, to 8 cm across; umbellets 5–9-flowered, without involucre or with few squamiform leaflets; length of pedicels variable, becoming thickened; calyx-teeth obscure; petals yellow, obovate, acuminate with depressed midrib and tip inward curved, 1.8 mm long; mericarps (unripe) with thick pericarp, oblong-ovoid, about as long as pedicels; ribs inflated; canals solitary in furrows, 2 toward commissure. Fl. June. (Plate XII, Figure 2.)

Mountain slopes. — Centr. Asia: Dzu-Tarb. Endemic. Described from Tarbagatai. Type in Tomsk.

51. *F. rigidula* DC. Prodr. IV (1830) 172; Ldb. Fl. Ross. II, 301; Boiss. Fl. or. II, 988; Grossg., Fl. Kavk. III, 178. — *F. rigidula* var. *caucasica* Fisch. et Mey. in Schrenk, Enum. pl. nov. II (1842) 42. — *F. laeta* Woron. in Tr. Bot. inst. ser. 1, I (1933) 219. — Ic.: Korov. Monogr. (1947) Table XXXI, Figure 1.

Perennial; glaucescent, glabrous or sparsely scabrous-hairy plant; stem thin, ca. 0.5 m high, paniculately branching above; branches alternate, upper whorled; leaves persistent; radical leaves with long, slightly scabrous petioles, their blade triangular, multipinnatisect into short, fleshy, narrowly linear, to 5 mm long, acute lobules sulcate above; cauline leaves with reduced blade, upper [reduced to] cylindrical, coriaceous, amplexicaul sheaths. Umbels variable, terminal subsessile or short-pedicel, of 6–10(12-) rays, 5–6 cm across, lateral 1–3, on long pedicels; umbellets 10–15-flowered, with involucre of squamiform deciduous leaflets; petals yellow, oval-lanceolate, with thickened midrib, and acuminate inward curved tip, 1 mm long; mericarps ellipsoid or oblong-ellipsoid, dorsally slightly inflated, angled along ribs, with narrow margin, 10–12 mm long, 5.5–6 mm wide; canals broad, solitary in furrows, 4–6 toward commissure. Fl. May, Fr. June.

- 110 Dry slopes. — Caucasus: Dag., E. and S. Transc. Gen. distr.: Iran. Described from Iran (Seidkhai). Type in Geneva.

Group 2. *Ovinæ* Korov., Monogr. (1947) 9. — Leaf lobules more or less scabrous; position of umbels typical, canals solitary in vallecule (except for *F. dshizakensis*).

52. *F. ovina* Boiss. Fl. or. II (1872) 986. — *F. stewartiana* var. *affghanica* O. E. Schulz in Notizbl. Bot. Gart. Berlin, XI (1933) 877. — *Peucedanum ovinum* Boiss. Diagn. pl. nov. ser. 1, 6 (1845) 61. — Ic.: Korov., Monogr. (1947) Table XXXII, Figure 1.

Perennial; 1-2-stemmed scabrous plant, covered with short stiff hairs; stem robust, slightly thickened at nodes, ca. 0.5 m high, paniculately branching above; branches alternate below, whorled above; leaves persistent, stiff when dry; radical leaves with petioles, their blade triangular, ternate, its sections on short rhachises, tripinnatisect into small, to 5 mm long, fleshy, oval, incised-dentate lobules; cauline leaves with reduced blade, upper leaves reduced to oval-lanceolate, swollen not amplexicaul sheaths. Umbels variable, terminal sessile or on reduced pedicels, of 3-10 rays, 4-6 cm across; the lateral 1-2, on long pedicels; umbellets 7-10-flowered, without involucre or involucre of few squamiform, deciduous leaflets; calyx-teeth small; petals yellow, elliptic, slightly depressed along midrib, tapering to inward curved tip; stylopodium flattened-conical, with thickened margins; mericarps ellipsoid, inflated, 7-10 mm long; ribs filiform; canals broad, swollen, solitary in furrows, 4-8 toward commissure. Fl. May-June, Fr. June-July.

Stony mountain slopes. — Centr. Asia: Dzu-Tarb. (Dzungarian Ala-Tau), T. Sh., Pam.-Al., Mtn. Turkm. Gen. distr.: Iran. Described from Iran (Persepolis). Type in Geneva.

53. *F. microcarpa* Korov., Monogr. (1947) 58. — Ic.: Korov., *ibid.*, Table XXXIII, Figure 2.

Perennial; root cylindrical, its neck covered with fibers of dead sheaths; stem thin, robust, less than 0.5 m high, with alternate branches above; leaves coriaceous, persistent, with stiff hairs on both surfaces; radical leaves with short petioles dilated at base, their blade broadly rhombic, ternate, segments tripinnatisect into ca. 13 mm long, spatulate-oval, palmatifid lobules; cauline leaves with reduced blade, upper represented by oval, coriaceous, amplexicaul sheaths. Umbels small, variable, terminal on short pedicels, of 5-10 rays, ca. 3 cm across, lateral solitary, on long pedicels; umbellets 5-10-flowered, without involucre; flowers not seen; mericarps ellipsoid, inflated, angled along ribs, with narrow margin, 5-6 mm long; canals broad, solitary in furrows, 4 toward commissure. Fr. June-July.

Desert slopes in mountains. — Centr. Asia: Dzu-Tarb. (Dzungarian Ala-Tau), T. Sh. Endemic. Described from Dzungarian Ala-Tau. Type in Leningrad.

54. *F. dshizakensis* Korov., Monogr. (1947) 58. — Ic.: Korov., *ibid.*, Table XXXIV, Figure 1.

Perennial; root cylindrical, its neck covered with fibrous remnants of last year's sheaths; stem ca. 40 cm high, thin, flexible, slightly swollen at nodes, weakly branching above, upper branches clustered in small groups; leaves persistent, canescent, densely covered with stiff hairs; radical leaves with short, firm and thick pedicels expanded to sheaths, their blade rhombic, ternate, its segments tripinnatisect into oval, fleshy, pinnatifid, 3 mm long lobules with curled margins; cauline leaves with obsolete blade, upper reduced to oval, inflated, amplexicaul, coriaceous sheaths. Umbels variable, terminal subsessile, of 5-10 rays, 4 cm across, lateral 1-3, on long pedicels; umbellets 10-flowered, with involucre of squamiform leaflets; calyx-teeth triangular; petals yellow, oval, attenuate, obtuse, with

thickened midrib; mericarps obovoid, angled along ribs, with broad margin, 8 mm long, 5 mm wide, shorter than pedicels; canals narrow, 2-3 per furrow, 8 toward commissure. Fl. April, Fr. May.

Stony slopes. — Centr. Asia: T. Sh. (Turkestan Range, Mogol-Tau, Nura-Tau), Pam.-Al. (Zeravshan Range). Endemic. Described from Zeravshan Range. Type in Tashkent.

55. *F. stylosa* Korov., Monogr. (1947) 58. — *F. pachycarpa* Korov. in Tr. Sredneaz. univ. VIII ser. 24 (1935) 11, nom. nud.; Pavl., Fl. Tsentr. Kazakhst. II (1935) 532. — Ic.: Korov., Monogr. Table XXXIV, Figure 2.

Perennial; root cylindrical, its neck covered with fibers and dead petioles; stem robust, thin, ca. 0.5 m high, branching above to produce oblong-ovoid panicle; leaves pale green, scabrous, covered with short hairs, persistent radical leaves with short petioles, their blade rhombic, ternate where petioles branch, with 2 accessory sessile segments; segments of 112 blade multi-(4-)pinnatisect into small, oval, 5 mm long, palmatifid or -partite lobules, their sections linear or oblong, dentate above; cauline leaves with obsolete blade on oval coriaceous sheath. Umbels variable, terminal sessile or on very short pedicels, of 7-15 rays, 4-8 cm across, lateral 1-2, on long pedicels; umbellets 10-15-flowered, with involucre of squamiform leaflets; calyx edentulate; petals yellow, elliptic, acuminate, with thick midrib, curved inward; stylopodium flattened-conical, with thickened undulant margin; styles elongate; mericarps oblong-ovoid, inflated, with very narrow margin, 9 mm long, 4-5 mm wide; ribs filiform, protruding; canals broad, inflated, solitary in furrows, 4-6 toward commissure. Fl. May-June, Fr. June-July.

Stony slopes of desert highlands. — Centr. Asia: Balkh. (Bet-Pak-Dala), T. Sh. (Chu-Ili Mountains, Bukan-Tau, Syr Darya, Kara-Tau). Endemic. Described from Chu-Ili Mountains, near Aiderka. Type in Tashkent.

56. *F. lapidosa* Korov., Monogr. (1947) 59. — Ic.: Korov., *ibid.*, Table XXXV, Figure 1.

Perennial; pale green, multicaulescent, scabrous plant, covered with stiff hairs; stem ca. 60 cm, robust, branching in upper part to produce oblong-oval panicle; branches of panicle alternate, upper whorled; leaves stiff, more or less scabrous on both surfaces; radical leaves with short petioles, their blade rhombic, with 2 lateral accessory segments, tripinnatisect into oval, broadly sessile, 2-3 cm long lobules repeatedly divided into broadly linear, divaricate, mucronate lobes, cauline leaves with reduced blade on inflated, coriaceous, oval-lanceolate, amplexicaul or not amplexicaul sheaths. Umbels variable, terminal subsessile or on short stalks, of 6-12 rays, 3-6 cm across, lateral solitary or in whorls of 2-3; umbellets 10-, rarely 15-flowered, with thickened node, involucre of squamiform, deciduous leaflets; mericarps often 8-9 mm long, ellipsoid, inflated, with prominent keel-shaped ribs and rather broad margin; canals broad, solitary in furrows, 2 toward commissure. Fl. June, Fr. July.

Stony slopes. Centr. Asia: T. Sh. Endemic. Described from Briam Gorge. Type in Tashkent.

57. *F. rubroarenosa* Korov., Monogr. (1947) 59. — Ic.; Korov., ibid., Table XXXIX, Figure 1.

113 Perennial; canescent plant covered with short stiff branching hairs; stem ca. 1 m, robust, paniculately branching above, its neck covered with fibers; upper branches whorled, lower alternate, approximate; leaves hairy on both surfaces, persistent; radical leaves with short sturdy petioles, their blade triangular, tripinnatisect, its terminal sections oval, with expanded base, in turn pinnatifid into oval, acute, dentate, 10–15 mm long lobules; cauline leaves with coriaceous, oval-lanceolate sheaths. Umbels variable, terminal of 8–13 rays, subsessile, 8–10 cm across, lateral 3–4, on long stalks; umbellets 10–15-flowered, without involucre; flowers not seen; mericarps (unripe) with protruding ribs, turning black when dried, canals broad, solitary in furrows, 4 toward commissure. Fr. June.

Red sandstone outcrops. — Centr. Asia: T. Sh. Endemic. Described from the Kugart River. Type in Tashkent.

58. *F. ferganensis* Lipsky in Sched. ad Herb. Inst. bot. Ac. Sc. URSS; Korov., Monogr. (1947) 59. — Ic.: Korov., ibid., Table XXXV, Figure 2.

Perennial; plant scabrous, covered with short hairs, its neck covered with abundant fibers of dead leaves; stem ca. 1 m high, robust, branching from middle, all branches in whorls; leaves coriaceous, persistent; radical leaves with long petioles, their blade with 4 accessory segments; segments of first order bipinnatisect into rounded-oval, 3–4 cm long and as wide sections contracted at base, these tripartite into linear, acuminate overlapping lobules; cauline leaves with reduced blade, with longer and sparser lobules, their sheaths inflated, ovate, acute, amplexicaul. Umbels variable, terminal sessile, of 10 rays, ca. 8 cm across, lateral 1–3, on long stalks; umbellets 5–8-flowered, without involucre; calyx edentulate; petals yellow, ovate, with short, tapering, inward curved tip; stylopodium flattened-conical, with broadened plicate margin; mericarps ellipsoid, dorsally inflated, auriculate, to 15 mm long; canals broad, solitary in furrows, 6 toward commissure. Fl. June, Fr. July.

Stony slopes in subalpine belt. — Centr. Asia: T. Sh. (Fergana Range), Pam.-Al. (Alai Range). Endemic. Described from Fergana Range. Type in Leningrad.

59. *F. dissecta* Ldb. Fl. Ross. II (1844) 301; Kryl., Fl. Zap. Sib. VIII, 1991. — *F. rigidula* β . *songarica* Schrenk, Enum. pl. nov. II (1842) 43. — *Peucedanum dissectum* Ldb. Fl. alt. I (1829) 306. — *P. laciniatum* Heynh. Nomencl. (1840) 504. — *P. Ledebourii* Steud. Nomencl. ed. 2 (1841) 311. — Ic.: Ldb. Ic. pl. Fl. Ross. tab. 181; Korov., Monogr. (1947) Table XXXVI, Figure 2.

114 Perennial; root cylindrical, its neck covered with abundant fibers of dead leaves; stem ca. 40 cm high, thin, robust, branching from middle to produce oblong-ovoid panicle, branches in whorls of few; leaves canescent, rather soft, covered with stiff hairs; radical leaves petioled, their blade broadly rhombic, multipinnatisect into small, linear, 1–2 mm long lobules; cauline leaves with reduced blade, their sheaths oblong, amplexicaul, hardening at maturity. Umbels variable, terminal on short stalk, of 4–10 rays, ca. 3 cm across,

lateral in groups of 2-3; umbellets 8-10-flowered, with involucre of several lanceolate scales; calyx short-toothed; petals yellow, oval, with inward curved tip; mericarps flattened, with narrow margin, 7 mm long; ribs filiform; canals solitary in furrows, 6 toward commissure. Fl. May, Fr. June.

Herbaceous slopes and sands. — W. Siberia: Alt. (SW); Centr. Asia: Balkh., Dzu-Tarb. Gen. distr.: Sinkiang (Kuldja district). Described from the Talovka River near Bukhtarminsk. Type in Leningrad.

60. *F. pallida* Korov., Monogr. (1947) 60. — Ic.: Korov., *ibid.*, Table XXXVII, Figure 1.

Perennial; pale, canescent plant, densely covered with stiff hairs; stem ca. 1 m high, rather thick, robust, branching nearly from middle to produce broad ovoid panicle, branches in whorls, except for lower ones; leaves persistent, multi-(6-) pinnatisect into numerous, linear, entire or 2-3-partite, acuminate, 10 mm long lobules diverging at an acute angle; cauline leaves with reduced blade on oval-lanceolate, coriaceous, amplexicaul sheath. Umbels variable, terminal of 15 rays, 6-8 cm across, 4 lateral, crowded, on long stalks; umbellets 10-15-flowered, without involucre, fertile with thickened node; flowers not seen; mericarps obovate, rather flat, with broad margin, 14 mm long, 8 mm wide, about as long as pedicels; ribs filiform, slightly protruding; canals 1-2 in furrows, 2 toward commissure, 3-4 along margin. Fl. May-June, Fr. July.

Stony mountain slopes in shrub belt. — Centr. Asia: T. Sh. (Kirghiz Range, Talass Ala-Tau, Kara-Tau and others). Endemic. Described from Manzur-Ata. Type in Tashkent.

61. *F. tenuisecta* Korov. in Ind. sem. Hort. Bot. Univ. As. Med. (1936) No. 421, nom. nud.; Korov., Monogr. (1947) 60. — Ic.: Korov., *ibid.*, Table XXXVII, Figure 2.

115 Perennial; root thickened, fusiform, its neck densely covered with fibers from dead leaves; stem 80-90 cm high, robust, paniculately branching in upper part to produce oblong-ovoid panicle, with alternate branches below, whorled branches in upper part, leaves oval-rhombic, scabrous, covered with short stiff hairs; radical leaves with long petioles, their blade ternate, with 2 accessory segments, many (5) times dissected into numerous, 2-5 mm long, linear or oblong-linear, obtuse lobules canaliculate above; cauline leaves with reduced blade, on inflated amplexicaul, coriaceous, oval-lanceolate sheath; upper leaves represented by sheaths. Umbels variable, terminal of 8-15 rays, sessile or on short stalks, 6-8 cm across, lateral 2-5, on long stalks, overtopping terminal umbel; umbellets 10-flowered, with involucre of squamiform deciduous leaflets; calyx edenticulate; petals yellow, oval, tapering at apex and curved inward, 1.2 mm long; fruit oblong-ovoid, inflated, with pale thickened margin, 9 mm long, 5 mm wide, their ribs inflated; canals broad, solitary in furrows, 2-6 toward commissure. Fl. May-June, Fr. June-July.

Herbaceous mountain slopes. — Centr. Asia: T. Sh. (Talass Ala-Tau, Kara-Tau, Chatkal Range). Endemic. Described from Kel'temashat. Type in Tashkent.

62. *F. angreni* Korov. in Ind. sem. Hort. Bot. Univ. As. Med. (1932) No. 583, nom. nud.; Korov., Monogr. (1947) 61. — Ic.: Korov., *ibid.*, Table XXXVI, Figure 2.

Perennial, branching at neck; stem ca. 1 m high, thin, flexible, branching above middle to produce oblong panicle; lower branches alternate, upper in whorls of few; leaves canescent, radical short-petioled, oblong-triangular, multipinnatisect into soft, narrow, linear lobules 12 mm long, 2 mm wide, cauline leaves with coriaceous, lanceolate, recurved sheaths. Umbels variable, terminal on short stalks, of 8–12 rays, 40 mm across, lateral single or in groups of 2–3; umbellets 10-flowered, without involucre; flowers not seen; mericarps oblong-oval, inflated, with flat margin, 10–11 mm long, 5.5 mm wide; ribs filiform; canals rather broad, solitary in furrows, 2 toward commissure. Fl. May.

Herbaceous slopes. — Centr. Asia: T. Sh. (W.). Endemic. Described from the Angren River valley. Type in Tashkent.

63. *F. kopetdagensis* Korov., Monogr. (1947) 61. — Ic.: Korov., *ibid.*, Table XXXVIII.

16 Perennial; ciliate-hairy plant, its neck densely enveloped with fibers; stem thin, robust, ca. 1 m high, with whorled branches above; leaves soft, withering before ripening; radical leaves with rhombic, ternate blade, its sections multipinnatisect into narrow linear, flat, short lobules; cauline leaves with reduced blade, upper reduced to oval or oblong-oval, often withering sheath. Umbels variable, terminal subsessile, of 10 rays, ca. 4 cm across, lateral 1–2, on long stalks; umbellets 10–15-flowered, without involucre; calyx short-toothed; petals yellow, oval, nearly flat, with tapering inward curved apex; stylopodium with thickened, lobate, elevated margin; styles elongate; stigmas not thickened; mericarps ellipsoid, with narrow margin, 8–9 mm long, longer than pedicels; ribs filiform, slightly protruding; canals rather broad, solitary in furrows, 4 toward commissure. Fl. May, Fr. June.

Stony mountain slopes in juniper belt. — Centr. Asia: Mtn. Turkm., Pam.-Al. Gen. distr.: Iran (Afghanistan). Described from W. Kopet Dagh. Type in Tashkent.

64. *F. orientalis* L. Sp. pl. (1753) 247; Ldb. Fl. Ross. II, 300; Boiss. Fl. or. II, 986; Shmal'g., Fl. I, 406; Grossg., Fl. Kavk. III, 178. — *Peucedanum orientale* Boiss. in Ann. Sc. Nat. ser. IV, 1 (1844) 309. — *P. rupestre* Boiss. et Bal. in Boiss. Diagn. pl. nov. ser. 2, VI (1859) 85. — Ic.: Korov., Monogr. (1947) Table XXXVIII, Figure 2.

Perennial; root thickened, fusiform, its neck covered with many fibers; stem thin, robust, twisted, slightly thickened at nodes, ca. 0.5 m thick, more or less corymbiformly branching; leaves soon wilting, scabrous beneath, covered with short stiff hairs; radical leaves with reduced petioles, their blade triangular, ternate; segments of first order multipinnatisect into short, hardly 5 mm long, narrow linear lobules; cauline leaves smaller, upper represented by oblong-lanceolate, slightly inflated coriaceous amplexicaul sheath. Umbels variable, terminal subsessile or on short stalk, of 10 rays, 6–8 cm across, lateral single or in groups of 2–3; umbellets 10–15-flowered, without involucre; calyx short-toothed; petals



PLATE XIII. 1 — *Ferula aitchisonii* K.-Pol.; 2 — *F. fedtschenkoana* K.-Pol.

yellow, oval, with depressed midrib and short, obtuse inward curved tip; stylopodium conical, with thickened undulate-lobate margin; styles elongate, not thickened; mericarps brown, elliptic, plano-compressed, with rather broad margin, 10 mm long; ribs filiform, protruding; canals narrow, solitary in furrows, 2 approximate canals toward commissure. Fl. June–August, Fr. August.

Steppes, stony slopes, cliffs. — European part: Bl., Crim.; Caucasus: E. Transc. (Beshbarmak Mountain). Gen. distr.: Arm.-Kurd. Described from the East. Type in London.

65. *F. xeromorpha* Korov., Monogr. (1947) 62. — Ic.: Korov., *ibid.*, Table XXXIII, Figure 1.

Perennial; scabrous plant covered with stiff hairs, its neck covered with fibers and other remnants of the previous year's leaves; stem ca. 0.5 m high, branching from middle to produce oval panicle; branches in few whorls above; leaves coriaceous, persistent; radical leaves with short petioles dilated to sheath, their blade broadly rhombic, ternately dissected, with primary segments pinnatisect into oval, to 5 cm long decurrent sections pinnatifid or -partite into unequal, overlapping, irregularly toothed lobules with undulant margin; cauline leaves with reduced blade on swollen, oval, coriaceous, amplexicaul sheaths. Umbels variable, terminal short-stalked, of 11 rays, ca. 8 cm across, lateral 1–3, on long stalks; umbellets 10-flowered, without involucre; calyx short-toothed; petals yellow, oval, depressed along midrib, with obtuse inward curved tip; stylopodium flattened-conical with undulant margin; mericarps oblong-ellipsoid, inflated, with thickened plicate pericarp, 10 mm long, 5 mm wide; ribs carinate; canals medium-sized, solitary in furrows, 8 toward commissure. Fl. May, Fr. June.

Stony slopes in mountain semidesert belt. — Centr. Asia: T. Sh. (W.). Endemic. Described from the top of Aym-Tau. Type in Leningrad.

66. *F. ligulata* Korov., Monogr. (1947) 63. — Ic.: Korov., *ibid.*, Table XXXVI.

Perennial; stem robust, slightly thickened at node, ca. 1 m high, branching from middle to produce broad panicle; leaves coriaceous, scabrous on both surfaces, covered with short stiff hairs, persistent; radical leaves short-petioled, triangular, ternately dissected; segments bipinnatisect into ca. 3 cm long, oval, decurrent, acutely incised-dentate lobules; cauline leaves with nearly ovate, inflated, amplexicaul sheaths. Umbels variable, terminal short-stalked, of 10 rays, ca. 10 cm across, lateral 3–4, on long stalks; umbellets 8–12-flowered, without involucre; flowers not seen; mericarps (unripe) oblong-ovoid, inflated, 10 mm long; ribs filiform, protruding; canals 1–2 per furrow, 10 toward commissure. Fl. May, Fr. June.

Slopes. — Centr. Asia: T. Sh. (W.). Endemic. Described from specimens grown in Tashkent from seeds collected on the top of Aym-Tau. Type in Leningrad.

67. *F. mollis* Korov., Monogr. (1947) 63. — Ic.: Korov., *ibid.*, Table XXVII, Figure 1.

Perennial; pale green, soft-haired plant; stem thin, robust, ca. 0.5 m high, paniculately branching above; branches in whorls; leaves soft,

persistent, both surfaces covered with short soft hairs; petioles of radical leaves dilated into sheaths, their blade triangular-oval, multi-(3-4)-pinnatisect into slightly decurrent, oval, large-toothed, to 2 cm long lobules; cauline leaves with reduced blade, on oval-lanceolate, inflated, amplexicaul sheath; umbels variable, terminal subsessile, of 10 rays, 4-5 cm across, lateral 1-2, on long stalks; umbellets 10-flowered, without involucre; calyx-teeth triangular; petals reflexed, pale yellow, oval, nearly flat, with inward curved tip, 2 mm long; stylopodium flattened-conical; mericarps ovoid, of same color, 10 mm long, 6 mm wide; ribs filiform; canals rather broad, solitary in furrows, 6 toward commissure. Fl. May-June, Fr. June.

Stony slopes in lower mountain belt. — Centr. Asia: Syr D., T. Sh. (W.), Pam.-Al. (Kugitang). Described from Fergana valley. Type in Leningrad.

68. *F. latiloba* Korov., Monogr. (1947) 63. — Ic.: Korov., *ibid.*, Table XXXIX, Figure 2.

Perennial plant with short soft hairs, its base covered with fibers and remnants of dead leaves; stem single, ca. 0.5 m high, with whorled branches from middle or above; leaves persistent, sparse-haired on both surfaces, lower with long petioles and triangular, ternate blade, its segments bipinnatisect into nearly oval decurrent, 2 cm long sections pinnatifid into oval, palmatifid-dentate lobules tapering at base; cauline leaves with small blade with narrower lobules on inflated, oval, acuminate, coriaceous, amplexicaul sheath. Umbels variable, terminal subsessile, of 15 rays, ca. 5 cm across, lateral single or in pairs on long stalks; umbellets 10-flowered, without
121 involucre; flowers not seen; mericarps (unripe) 9 mm long, obovoid, inflated, with narrow margin, as long as pedicels; ribs filiform, protruding; canals broad, solitary in furrows, 6 toward commissure. Fr. July.

Limestones. — Centr. Asia: T. Sh. (W.). Endemic. Described from Mogol-Tau Mountain. Type in Tashkent.

Section 2. *MACRORRHIZA* Korov., Monogr. (1947) 10. — Leaf lobules of various shapes, thin, glabrous, rarely slightly pubescent, soon wilting.

Group 1. *Sumbulus* (Reinsch) Korov. l. c. — Genus *Sumbulus* Reinsch in Jahrb. Pract. Pharm. XIII (1846) 69. — Stems few, leaf lobules broad, tapering at base, sparingly pubescent beneath.

69. *F. moschata* (Reinsch) K.-Pol. in Izv. Voron. obshch. estestvoisp. 1 (1925) 94. — *F. Sumbul* Hook. in Bot. Mag. Cl (1875) tab. 6196. — *Sumbulus moschatus* Reinsch in Jahrb. Pract. Pharm. XIII (1846) 69. — *Euryangium Sumbul* Kauffm. in Nouv. Mém. Soc. Nat. Mosc. XIII (1876) 258. — *Peucedanum Sumbul* Baill. Hist. pl. VII (1880) 186. — Ic.: Korov., Monogr. (1947) Table XL, Figure 1.

Perennial; root thick, multicapital, its neck covered with fibers and remnants of petioles; stems few, medium-sized, slightly hairy at first, becoming subglabrous, thin, ca. 50 cm high, corymbiformly branching in upper part; branches alternate below, whorled above; leaves stiff, persistent, slightly hairy beneath; radical leaves oval-triangular, with long petioles

joined to blade, blade tripinnatisect, sparse, its sections generally lanceolate or oblong, 20–30 mm long, 10–15 mm wide, entire or deeply dissected into more or less oval, acuminate lobules; cauline leaves with reduced blade, upper leaves reduced to narrow lanceolate sheaths. Umbels variable, terminal of 6–10 rays, 4–6 cm across, lateral single or in 2's, much below level of terminal umbel; umbellets 10–15-flowered, with involucre of lanceolate leaflets; calyx toothed; petals yellow, 0.7 mm long, oblong-oval, with acuminate inward curved tip; mericarps 7 mm long, twice as long as stalks, plano-compressed; ribs filiform; canals narrow, solitary in furrows, 2 toward commissure. Fl. June, Fr. July.

Stony slopes in shrub belt. — Centr. Asia: T. Sh. (Turkestan Range), Pam.-Al. (Zeravshan and Gissar ranges). Endemic.

70. *F. pseudooreoselinum* (Rgl. et Schmalh.) K.-Pol. in Izv. Voron. obshch. estestvoisp. I (1925) 94. — *F. mesophytica* Korov. in Ind. sem. Hort. Bot. Univ. As. Med. (1926) No. 192 (nom. nud.). — *Peucedanum pseudooreoselinum* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestv. antrop. i etnogr. XXXIV, 2 (1882) 36. — Ic.: Korov., Monogr. (1947) Table XV, Figure 2.

Perennial; root thick, its neck branching, densely covered with numerous brown fibers; stems often single, 2–3 m high, cylindrical, nearly leafless, hairy at first, becoming glabrous, violet-brown, branching at apex to produce sparse corymbiform panicle; branches, apart from upper, alternate, with short lateral branchlets; leaves soft, soon wilting, glabrous, green above, pale, slightly hairy beneath; radical leaves on long thick petioles, their blade broad, triangular, tritermately dissected, third order sections bipinnatisect into oval or oblong-oval, pinnatifid-dentate, 30–50 mm long, 10–40 mm wide lobules; cauline leaves nearly bladeless, reduced to wilting lanceolate sheaths. Umbels variable, terminal fertile, of 8–20 rays, ca. 6 cm across, lateral usually 2, opposite, with male flowers; umbellets 15-flowered, with involucre of 1–3 linear-subulate, membranous, downy leaflets; calyx edentate; petals yellow, oblong-elliptic, with inward curved tip; mericarps plano-compressed, 7 mm long, twice as long as pedicels; ribs filiform; canals narrow, solitary in furrows, 2 toward commissure. Fl. June, Fr. July.

Shrubby thickets and forests. — Centr. Asia: Pam.-Al., T. Sh. (W.). Endemic. Described from Iskander Lake and Pasrut Gorge. Type in Leningrad.

Economic importance. The fresh root weighs to 35 kilograms; when cut it yields a milky juice smelling like turpentine, containing 2–5% essential oil (3–5% of the air-dried roots). This oil consists of d^a-pinene (90%), d-phellandrene (5%) and an insignificant quantity of cumic aldehyde and sesquiterpenes. The resin is a brownish, medium hard, sticky mass with a faint odor (see: I. P. Tsukervanik, V. V. Bersutskii, S. V. Burtseva and B. K. Arzikovich. *Kompleksnoe khimicheskoe issledovanie kornei Ferula pseudooreoselinum* (Complex Chemical Study of the Roots of *Ferula pseudooreoselinum*)).

Group 2. Schair Korov., Monogr. (1947) 10. — Leaf lobules narrow, linear or linear-lanceolate, sheaths inflated.

71. *F. leucographa* Korov., Monogr. (1947) 64. — Ic.: Korov., *ibid.*, Table XLI, Figure 1.

Perennial; stem 40–60 cm high, thin with spreading branches from middle 123 or below; lower branches alternate, upper in umbel, typically white-striped; leaves persistent, glaucescent, glabrous; radical leaves broadly rhombic, on short petioles dilated at base, their blade quadraternately dissected into linear-lanceolate flat, straight, acuminate, 60 mm long, 3 mm wide lobules with 3–5 parallel white nerves; cauline leaves with oval-lanceolate, amplexicaul, stiff sheaths. Umbels variable, terminal of 4–8 rays, ca. 6 cm across, lateral paired, on long stalks; umbellets 10-flowered; involucre absent or of 1–3 small deciduous leaflets; calyx short-toothed; petals yellow, oval, tapering with curved apex; stylopodium flat, with undulant margin; mericarps (unripe) 6 mm long, as long as pedicel, inflated, with narrow margin; ribs protruding at angles; canals broad, solitary in furrows, 8–10 toward commissure. Fr. June.

Desert slopes. — Centr. Asia: T. Sh. (Syr Darya Kara-Tau). Endemic. Described from Kel'te-Mashat. Type in Tashkent.

72. *F. involucrata* Korov., Monogr. (1947) 65. — Ic.: Korov., *ibid.*, Table XLI, Figure 2.

Perennial; root fusiform, its neck densely covered with fibers; stem thin, robust, ca. 0.5 m high, branching above to produce corymbiform panicle; lower branches alternate, upper opposite; leaves thickish, pale green, glabrous, persistent; radical leaves not seen; cauline leaves sessile, on short, hardly inflated coriaceous sheath, their blade triangular-oval, ternate, sections of the first order, ternately dissected, on long petiolules; lobules lanceolate, flat, with distinct protruding white parallel nerves, to 90 mm long, 7 mm wide. Umbels alike, only terminal of 10 rays, ca. 9 cm across; umbellets 10-flowered, with involucre of herbaceous, lanceolate-subulate, persistent leaflets; calyx short-toothed; petals yellow, obovate, with short, abruptly tapering, inward curved tip and distinctly protruding branching nerves; stylopodium with slightly raised margin; styles elongate; ovary angled along ribs; canals broad, 1 per furrow, 2 toward commissure. June.

Dry slopes. — Centr. Asia: T. Sh. (Syr Darya Kara-Tau). Endemic. Described from Aktau. Type in Tashkent.

73. *F. aitchisonii* K.-Pol. in Bot. mat. gerb. Glavn. Bot. Sada, II (1921) 61. — Ic.: Korov., Monogr. Table XXIV, Figure 2.

Perennial; stem thin, flexible, ca. 0.5 m high, spreading-paniculate above; lower branches alternate, upper grouped in umbel; leaves pale green, glabrous radical leaves broadly rhombic, multi-(4-)-pinnatisect into straight linear, 124 acute, thickish, 30 mm long, 1–2 mm wide lobules; cauline leaves almost reduced to inflated, oblong-oval, amplexicaul sheath. Umbels only terminal, of 3–6 rays, 40–60 mm across in fruit; umbellets 5–10-flowered, with involucre of few unequal leaflets; flowers not seen; mericarps ovoid, pale brown, inflated, angled along ribs, 13 mm long, 7 mm wide, nearly as long as pedicels; canals broad, solitary in furrows, 2 toward commissure. (Plate XIII, Figure 1.)

Mountain slopes. — Centr. Asia: T. Sh. Endemic. Described from Kulagan-Tau Mountain. Type in Leningrad.

74. *F. gypsacea* Korov., Monogr. (1947) 65. — Ic.: Korov., ibid., Table XXIII, Figure 1.

Perennial; root cylindrical, tuberiformly thickened; stem single, ca. 0.5 m high, robust, thin, slightly thickened at nodes, bifurcately branching from middle, its neck covered with fibers and petioles of dead leaves; leaves glabrous, soon wilting; radical leaves not seen; cauline leaves triangular, many times ternately dissected into thickish, filiform, straight, to 4 cm long lobules, their sheaths coriaceous, narrowly lanceolate, amplexicaul, appressed to stem, with acute teeth at apex. Umbels confined to tips of branches, of 3–7 rays, 6–7 cm across, sometimes there is a lateral umbel near base of terminal ones; umbellets of 10–13 rays, with involucre of herbaceous, persistent, lanceolate leaflets; calyx of well developed triangular teeth; petals pale yellow, elliptic, with short, tapering, inward curved tip, 2–3 mm long, long persistent; stylopodium flattened-conical with broadened thickened slightly undulant margin; styles not thickened at apex; mericarps (unripe) oblong-ovoid; canals solitary in furrows, 2 toward commissure, all canals broad. Fl. June.

Outcrops of gypsum clays. — Centr. Asia: T. Sh. (W.). Endemic. Described from Arym-Tau and Kyzdynyk-Tau Mountains. Type in Tashkent.

75. *F. ugamica* Korov. in Ind. sem. Hort. bot. Univ. As. Med. (1924) No. 87, nom. nud.; Korov., Monogr. (1947) 66. — Ic.: Korov., ibid. Table XLII, Figure 1.

Perennial; high, slender, smooth, glaucous plant; stems numerous, ca. 1.5 m high, branching at apex to produce a nearly spherical panicle; branches thin, often in whorls of few; leaves smooth, shiny; radical leaves on long firm petioles, their blade rhombic, multi-(5-)-pinnatisect, lobules subfiliform, straight, 5–9 cm long, revolute, diverging at an acute angle; cauline leaves with reduced blade on inflated ovate, amplexicaul sheath. Umbels semispherical, variable, terminal on short stalk, of 10–18 rays, 5–12 cm across, lateral single or in pairs, on long stalks; umbellets 15-flowered, with deciduous involucre; flowers yellow; calyx-teeth triangular; petals elliptic, broadening at apex, inward curved, 1.5 mm long; stylopodium short-conical, with thickened undulant margin; mericarps obovoid, markedly inflated, 6–7 mm long, 4.5 mm wide; ribs protruding at rounded angles; canals solitary in furrows, 6 toward commissure. Fl. June–July, Fr. July–August.

Rocks in shrub belt. — Centr. Asia: T. Sh. (W.). Endemic. Described from Angren. Type in Tashkent.

76. *F. karatavica* Rgl. Schmalh. in Tr. Bot. Sada. V (1878) 594. — F. Sassyk K.-Pol. in Izv. Glavn. Bot. Sada, XVI (1916) 224. — Ic.: Korov., Monogr. Table XLII, Figure 2.

Perennial; root cylindrical, sometimes with few tuberiform swellings, its neck covered with fibers; stems single, ca. 1 m high, rarely stems 2–3, robust, cylindrical, profusely branching from middle to produce broad, spreading, ovoid panicle of thin, long branches arranged in whorls of few branches; leaves scabridulous (especially rhachises), soon wilting; radical leaves long-petioled, their blade rhombic, multi-(5-)-pinnatisect into numerous, narrow linear or filiform, glabrous or scabrous-margined, to 30 mm long

lobules diverging at an acute angle; cauline leaves with reduced blade of broader, longer lobules on inflated coriaceous, oblong-oval, amplexicaul sheath. Umbels variable, compact, stalked, terminal of 2–11 rays, to 15 cm across, lateral in groups of 3; umbellets often 10–(17-) flowered, without involucre; flowers on long thin pedicels; calyx-teeth short-triangular; petals pale yellow, recurved, broadly oval, flat, with short rounded inward curved tip, 2 mm long; stylopodium conical, with flat, lobate, broadened margin; styles long; mericarps yellow, obovoid, with narrow margin, sharply inflated dorsally along ribs, 10–11 mm long, 4.5–5.5 mm wide, $\frac{1}{3}$ length of pedicels; canals broad, solitary in furrows, 6 toward commissure. Fl. May–June, Fr. June–July.

Herbaceous slopes. — Centr. Asia: T. Sh., Pam.-Al. (Alai Range). Endemic. Described from Kara-Tau Range (Boroldai). Type in Leningrad.

Economic importance. The entire plant was found to be devoid of essential oil or alkaloids, but huge quantities of resins are present in the root and
 126 fruits (V. P. Bersutskii. Khimicheskoe issledovanie rasteniya *Ferula karatavica* Rgl. et Schmalh. (Chemical Study of the Plant *Ferula karatavica* Rgl. et Schmalh.)).

77. *F. schair* Borszcz. in Mém. Ac. Sc. Pétersb. sér. VII, III, 8 (1861) 37. — *Peucedanum schair* Baill. Hist. pl. VII (1880) 186. — Ic.: Borszcz. l. c. tab. VII; Korov., Monogr. (1947) Table XLIII, Figure 1.

Perennial; root thickened, ovoid, its neck covered with fibers; stems single or few (4), robust, medium thick, ca. 1 m high, branching above to produce spherical panicle; branches alternate below, in whorls of few above; leaves soft, soon wilting, glabrous; radical leaves with long firm cylindrical petioles, their blade spreading, triangular, segments with long petioles, multipinnatisect into narrow linear-lanceolate, flat, slightly revolute lobules, with prominent midrib, acuminate at both ends, 40 mm long, 2.5 mm wide; cauline leaves with reduced blade, upper reduced to coriaceous, oval-lanceolate not amplexicaul sheaths. Umbels variable, terminal sessile or subsessile, of 10–15(25) rays, 8–12 cm across, lateral 2–6, on long stalks, and 1–3 small, undeveloped umbels at base of terminal umbel; umbellets 13–18-flowered, without involucre or with involucre of few squamiform leaflets; calyx edentulate; petals yellow, oblong-elliptic, narrowly acuminate with inward curved tip, reflexed; stylopodium conical with markedly thickened margin; styles thickened at apex; mericarps brown, elliptic, plano-compressed, with broad margin, 8–10 mm long, 4.5–6 mm wide; ribs hardly protruding; canals narrow, solitary in furrows, 2 toward commissure. Fl. May, Fr. June–July.

Clayey-sandy deserts. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K. Endemic. Described from the desert between Kochkan-Su Lake and Arys'. Type in Leningrad.

78. *F. badhysi* Korov., Monogr. (1947) 67. — *F. oopoda* Aitch. in Trans. Linn. Soc. London, III (1888) 67, non Boiss. — Ic.: Aitch. l. c. tab. 18–19; Korov. l. c. Table XLIII, Figure 2.

Perennial; root thick, more or less cylindrical-ovoid, its neck densely covered with fibers; stems few, robust, cylindrical, violet, branching above to produce spherical panicle, branches in whorls of few; leaves soft,



PLATE XIV. *Ferula ferulacoides* (Stend.) Korov.

129 soon wilting, glabrous, radical with long petioles, and broad, spreading, rhombic, ternate blade, its segments multipinnatisect into linear, flat, 80 mm long, 2 mm wide lobules acuminate at both ends; cauline leaves with reduced blade, upper bladeless on inflated coriaceous, cup-shaped sheath to 15 cm [sic!] wide. Umbels variable, terminal sessile, of 15–27 rays, ca. 10 cm across; lateral umbels 1–3, on long stalks; umbellets 15–20-flowered, without involucre; flowers on thin filiform pedicels; calyx-teeth triangular; petals pale yellow, elliptic, with inward curved tip, 2 mm long, reflexed; stylopodium flattened-conical with lobed margin; styles not thickened; mericarps brown, plano-compressed, elliptic, with broad margin, 13 mm long, 7 mm wide; ribs angular, protruding; canals narrow, solitary in furrows, 2 toward commissure. Fl. April, Fr. May.

Sandy hills. — Centr. Asia: Mtn. Turkm. Gen. distr.: Iran (Afghanistan). Described from Badkhyz. Type in Tashkent.

79. *F. oopoda* (Boiss. et Buhse) Boiss. Fl. or. II (1872) 984; Grossg., Fl. Kavk. III, 178. — *Peucedanum oopodum* Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 100. — Ic.: Korov., Monogr. (1947) Table XLIV, Figure 1.

Perennial; root thickened, more or less ovoid, its neck densely covered with fibers; stems ca. 1 m high, single or few, robust, often violet, branching in upper part to produce spherical panicle; branches in whorls of few; leaves glabrous, pale green, radical with long petioles, their blade rhombic, ternate with sections of first order on long petiolules, multi-(4-)-pinnatisect into linear, thickish, 2 mm wide, 40 mm long, flat lobules acuminate at both ends, with thickened margins; cauline leaves with reduced blade, their sheaths markedly inflated, coriaceous, oval, to 6 cm wide. Umbels variable, terminal sessile or subsessile, with up to 26 rays, ca. 7 cm across; lateral umbels 1–2, on long stalks, passing into lanceolate sheaths; umbellets 10–15-flowered, without involucre; calyx-teeth small, triangular; petals pale yellow, nearly flat, elliptic, with short inward curved tip, 2 mm long, reflexed; stylopodium broadening, curved, with undulant margin; styles not thickened; mericarps plano-compressed, with narrow margin; ribs filiform, slightly protruding; canals narrow, solitary in furrows, inconspicuous at commissure. Fl. May, Fr. June.

Dry, often gypsiferous slopes. — Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm. (W. Kopet Dag). Gen. distr.: Iran. Described from near Nakhichevan. Type in Geneva.

130 80. *F. eremophila* Korov. in Monogr. (1947) 68.

Perennial; stems robust, cylindrical, of medium height, brownish with whorled branches above; leaves persistent, glabrous, radical with long petioles, their blade oblong-oval, multi-(4-)-pinnatisect into thickish filiform, acute, 10 mm long, spreading lobules; cauline leaves not seen. Umbels uniform, but terminal with 9–14 rays, 6–7 cm across; umbellets 6–7-flowered, without involucre, thickened at node; mericarps oblong-ovoid, inflated with narrow margin, angled along ribs, 11–12 mm long, twice as long as pedicels; canals broad, solitary in furrows, 2 toward commissure face. Fr. August.

Dry, gypsiferous slopes of desert elevations. — Centr. Asia: Balkh. (Moyun-Kumy). Endemic. Described from Biilyu-Kul' Lake. Type in Alma Ata.

Note. This species, described after an incomplete specimen, distinctly differs from the related *F. karatavica* Rgl. et Schmalh. and *F. gypsacea* Korov., in the disposition of the umbels.

81. *F. tatarica* Fisch. in Spreng. Pugill. pl. 1 (1813) 27, syn. excl.; Ldb. Fl. Ross. II, 299; Shmal'g., Fl. I, 406; Grossg., Fl. Kavk. III, 178. — *F. longifolia* Spreng. Sp. Umbell. (1818) 86. — Ic.: Korov., Monogr. (1947) Table XLIV, Figure 2.

Perennial; stem single, thin, smooth, to 50 cm high, branching above to produce loose corymbiform panicle; branches alternate; leaves persistent, radical with long petioles, their blade sparse, triangular, bipinnatisect into flat, scabrous-margined, lanceolate-linear, to 9 cm long acuminate lobules; cauline leaves with reduced blade, upper represented by lanceolate, acuminate sheaths; umbels variable, terminal short-stalked, of 4–5 rays, 2–3 cm across, lateral single; umbellets 10-flowered, without involucre, rarely involucre reduced to small scales; petals broadly obovate, tapering to inward curved tip; stylopodium short-conical, with narrow, undulant, thickened margin; mericarps oblong-ellipsoid, inflated, with narrow margin, 8–9 mm long; ribs filiform, faintly protruding; canals narrow, solitary in furrows, 4 toward commissure. Fl. June, Fr. July.

Steppes (often solonetzic), semideserts, semishrub thickets. — European part: Transv., L. V., Bl.; W. Siberia: U. Tob. (S.), Irt. (S.); Caucasus: Cisc., Dag.; Centr. Asia: Ar.-Casp. (Ulu-Tau Mountains). Endemic. Described from the lower reaches of the Volga. Type was in Berlin.

Group 3. Clematideae Korov. — Monogr. (1947) 10. — Leaf lobules lanceolate, entire, or divided nearly to base; sheaths flat or slightly inflated.

131 82. *F. korshinskyi* Korov., Monogr. (1947) 68. — Ic. Korov., *ibid.*, Table XLV, Figure 1.

Perennial; root thickened, multicipital; stem to 2 m high, glaucous, thin, cylindrical, leafless, well-proportioned, twice or thrice branching above to produce corymbiform panicle; branches thin, alternate, with leaf sheaths at base; leaves soft, soon wilting, glabrous, radical with long petioles and spreading, multi-(4-)-pinnatisect blade with lanceolate-oval or lanceolate-oblong, acute, pinninervate, 20–50 mm long, 8–20 mm wide lobules; cauline leaves reduced to narrow lanceolate herbaceous sheaths. Umbels terminal, of 5–11 rays, 6–8 cm across; umbellets 20-flowered, without involucre; calyx-teeth short; petals yellow, small, oval, depressed along midrib, attenuate with broadened, inward curved apex; stylopodium flattened-conical, narrow elevated margin; styles truncate; mericarps glaucous, about as long as pedicels, plano-compressed, with broad margin, 6–7 mm long, 4–5 mm wide; ribs filiform, faintly protruding; canals narrow, solitary in furrows, 2 toward commissure. Fl. July, Fr. August.

Shrubby thickets in forest belt. — Centr. Asia: W. Sh. (W.), Pam.-Al. (Alai Range). Endemic. Described from the Naryn River valley. Type in Tashkent.

83. *F. clematidifolia* K.-Pol. in Bot. mat. gerb. Glavn. Bot. Sada. II (1921) 64. — Ic.: Korov., Monogr. Table XLV, Figure 2.

Perennial; root thickened, fusiform, with few branches just below surface, its neck densely covered with brown fibers; stem 60–80 cm high, single, robust, thin, with spreading branches from middle or higher producing sparse oblong-ovoid panicle; upper branches of panicle clustered, thin, elongate; leaves soft, soon wilting, glabrous; radical leaves with short firm petioles, and spreading, broadly triangular blade with tripinnatisect primary segments divided into linear-lanceolate or oblong-lanceolate, flat, acute, pinninervate, simple or ternately parted, 30–50 mm long, 5–10 mm wide lobules; cauline leaves with reduced blade on oval, slightly inflated, obliquely amplexicaul sheaths. Umbels variable, terminal on very short pedicel, lateral 2, on long pedicels; umbellets 15-flowered, without involucre; calyx toothed; petals elliptic, acute, slightly curved or spreading, yellow; stylopodium conical, with broad thickened margin; mericarps as long as stalks, plano-compressed, elliptic, with narrow margin, 11 mm long, 6 mm wide; 132 ribs filiform, slightly protruding; canals narrow, solitary in furrows, 2 toward commissure. Fl. May–June, Fr. June–July.

Mountain forests and shrubby formations. — Centr. Asia: Pam.-Al. Endemic. Described from Alai and Gissar ranges. Type in Leningrad.

84. *F. penninervis* Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 591. — *F. Olga* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestv. antrop. i etnogr. XXXIV, 2 (1882) 36. — Ic.: Korov., Monogr. Table XLV, Figure 1.

Perennial; stem 70–100 cm high, robust, thick, often single, smooth; sheaths scabrous-hairy when young, glaucescent, branching in upper third to produce broad ovoid panicle; panicle branches alternate below, seemingly umbellate above; radical leaves rhombic-oval, ternately dissected, soon wilting, their primary sections multi-(6-)-sect into lanceolate-linear, acute, distinctly pinninervate lobules, to 40 mm long, 8 mm wide, with undulant lanate margin; cauline leaves with reduced blade becoming obsolete above and broadly lanceolate, coriaceous sheath fused with, and recurved from stem. Umbels semispherical, variable, terminal on long pedicel, fertile, of up to 30 rays, 10–12 cm wide, lateral sterile, often in groups of 1–2 on long pedicels; umbellets compressed, 10–15-flowered, without involucels; flowers with yellow, oblong-oval petals and short triangular sepals; mericarps oblong-ovoid, glaucescent (especially ovaries [sic]), 10–13 mm long, 6 mm wide, with broad margin and carinate ribs; canals broad, solitary in furrows, which they fill completely, 2 toward commissure. Fl. June–July, Fr. July–August.

Stony slopes. — Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from Kara-Tau and the Chirchik River valley. Type in Leningrad.

85. *F. kaschkarovii* Korov., Monogr. (1947) 70. — Ic.: Korov., *ibid.*, Table XLVI, Figure 2.

Perennial; stem robust, thick, nearly 1 m high, branching above middle to produce oval panicle; branches alternate below, clustered above; leaves pale green, soft, soon wilting; radical leaves on firm petioles expanding at base, with rhombic, multi-(5-)-pinnatisect blade of linear 1-nerved, to 40 mm long, 2 mm wide lobules acuminate at both ends; cauline leaves nearly bladeless on coriaceous, oval-lanceolate, amplexicaul sheath. Umbels variable,



PLATE XV. *Ferula caspica* M.B.

135 terminal on pedicel, of 15–20 rays, 6 cm wide, lateral solitary or 2, opposite; umbellets 15-flowered with involucre of 5–7 narrow linear deciduous leaflets; calyx edentate; petals yellow, oblong-oval, inward curved; stylopodium short-conical; mericarps (unripe) inflated; canals broad, solitary in furrows, 2 toward commissure. Fl. July, Fr. August.

Stony mountain slopes in shrub belt. — Centr. Asia: T. Sh. Endemic. Described from the Uyunkur River valley. Type in Tashkent.

Group 4. Lobulatae Korov., Monogr. (1947) 10. — Leaf lobules ternate or pinnatifid into small, lanceolate or linear lobes; sheaths inflated or more or less flat.

86. *F. transitoria* Korov., Monogr. (1947) 70. — Ic.: Korov., *ibid.*, Table XIX, Figure 1.

Perennial; root thick, fusiform; stem ca. 1 m high, medium thick, slightly violet, paniculately branching in upper third; branches alternate below, whorled above; leaves slightly coriaceous, pale green, glabrous above, sparsely scabrous beneath, persistent; radical leaves with long petioles and broadly rhombic, ternate blade; segments of first order tripinnatisect into oval, 8 mm long lobules, cut into few toothed sections; cauline leaves smaller, upper reduced to oblong-lanceolate herbaceous sheath. Umbels variable, terminal on short pedicel, of 12–18 rays, ca. 5 cm across, lateral 1–2, on long pedicels; umbellets 9–12-flowered, with involucre of lanceolate, herbaceous, persistent leaflets; calyx-teeth triangular-lanceolate; petals yellow, lanceolate, with inward curved tip; stylopodium broad with elevated margins; stigmas not thickened; mericarps (unripe) inflated, ovoid, with narrow margin; ribs filiform; canals broad, swollen, solitary [in furrows], 2 at commissure. Fl. June.

Slopes. — Centr. Asia: Dzu-Tarb., Pam.-Al. Endemic. Described from Dzungarian Ala-Tau. Type in Leningrad.

87. *F. akitschkensis* B. Fedtsch. ex K. — Pol. in *Izv. Voron. obshch. estestvoisp.* I (1925) 94. — Ic.: Korov., Monogr. (1947) Table XLVII, Figure 1.

Perennial; stems (1–2) robust, ca. 1 m high, branching above to produce oval panicle; branches approximate, upper in whorls; leaves pale green, persistent; radical leaves with long petioles, ternate, segments of first order tripinnatisect into oval, smooth or scabrous lobules cut into oblong-
136 lanceolate, slightly dentate, 10 mm long, 5 mm wide sections; cauline leaves with reduced blade on broad lanceolate sheath. Umbels variable, terminal subsessile, of 10–20 (25) rays, ca. 50 mm across, lateral in groups of 2–4, on long pedicels; umbellets 15-flowered, with involucre of 5–7 herbaceous leaflets; calyx-teeth triangular; petals oblong-oval, with inward curved tip, 1 mm long; mericarps slightly inflated, ovoid, 10 mm long, 6 mm wide, nearly as long as pedicels; ribs filiform; canals narrow, solitary in furrows, 2 toward commissure. Fl. June, Fr. July.

Mountain slopes in lower belt. — Centr. Asia: (?) Balkh., T. Sh., Dzu-Tarb. (Dzungarian Ala-Tau). Gen. distr.: Sinkiang. Described from near Ak-Ichke railroad station (Dzungarian Ala-Tau). Type in Leningrad.

88. *F. songorica* Pall. ex Schult. Syst. veg. VI (1820) 598; Ldb. Fl. Ross. II, 300; Kryl., Fl. Zap. Sib. VIII, 1990. — *F. sibirica* Schang. in Pall. Neue nord. Beitr. VI (1793) 111, nom. nud. — *F. Ehrenbergi* Wolff in Fedde, Repert. XIX (1924) 310. — *Peucedanum sibiricum* Willd. Sp. pl. I (1797) 1406, non *Ferula sibirica* Willd. (1791). — ? *P. aureum* Spreng. Syst. veg. I (1825) 911. — ? *P. elatum* Ldb. Fl. alt. I (1829) 308. — Ic.: Ldb. Ic. pl. Fl. Ross. IV, tab. 305; Korov., Monogr. (1947) Table XLVII, Figure 2.

Perennial; root thick, cylindrical, its neck densely covered with long brown fibers and old petioles; stems usually 2–3, often 1, robust, erect, often violet at fruiting, paniculately branching above; branches alternate, upper whorled; leaves green, completely smooth, soft, soon wilting; radical leaves with long petioles, their blade multi-(5–6)-sect into linear, narrow or linear-lanceolate, entire or tripartite lobules to 3 cm long, 1.5 mm wide; cauline leaves almost reduced to lanceolate herbaceous sheath. Umbels variable, terminal on short stalk, of 10–20 rays, ca. 4–5 cm across, sub-spherical, lateral in cluster of 2–4; umbellets 15–20-flowered, with involucre of 5 persistent, lanceolate, herbaceous leaflets; calyx very short-toothed; petals yellow, oblong-oval, depressed along midrib, with inward curved tip, 1 mm long; stylopodium flattened-conical, without distinct margin; mericarps elliptic, plano-compressed, with narrow margin, yellowish, 8 mm long, 5 mm wide, about as long as stalks; ribs filiform; canals solitary in furrows, 2 toward commissure, rarely 4 canals. Fl. June, Fr. July.

Plains in steppes, mountain steppe valleys, rarely on exposed stony slopes. — W. Siberia: Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh., Dzu-Tarb. Endemic. Described from Siberia. Type was in Berlin.

137 89. *F. gracilis* Ldb. Fl. Ross. II (1844) 304; Korov., Monogr. (1947) 71. — *Peucedanum gracile* Ldb. Fl. alt. I (1829) 308. — *P. dubium* Ldb. l. c. (1829) 310. — *F. caspica* Kryl., Fl. Zap. Sib. VIII, 1992, non M.B. — Ic.: Ldb. lc. pl. Fl. Ross. IV, tab. 306; Korov., ibid., Table XIV, Figure 2.

Perennial; pale green subglabrous plant with fusiform root; stem not higher than 0.5 m, thin, branching from middle to produce sparse panicle; branches alternate; leaves soft, persistent, with scattered hairs beneath; radical leaves with short petioles, their blade sparse, triangular-oval, ternate, its sections bi- to tripinnatisect into oval segments pinnatipartite into linear-lanceolate, acute, 5–10 mm long lobules; cauline leaves with reduced blade, upper represented by herbaceous, flat, lanceolate wilting sheaths. Umbels variable, terminal and lateral sometimes slightly overlapping, lateral 1–2, at base of central umbel or below, central umbels of 5–9 rays, to 5 cm across; umbellets 10–12-flowered; calyx short-toothed; petals yellow, oval, acuminate, with inward curved tip; stylopodium flattened-conical with broadened thickened margin; styles truncate; mericarps ellipsoid, dorsally inflated, with narrow margin, 6–7 mm long; ribs filiform, distinctly protruding; canals narrow, 1 per furrow, 2 toward commissure. Fl. June, Fr. July. (Plate XI, Figure 2.)

Meadow steppes, sometimes solonchik mountains on exposed, sometimes pebbly slopes. W. Siberia: Irt., Alt.; Centr. Asia: Balkh. Endemic. Described from specimens collected between Bukhtarminsk and Lake Zaisan. Type in Leningrad.

90. *F. karataviensis* (Rgl. et Schmalh.) Korov. in Ind. sem. Hort. bot. Univ. As. Med. (1926) No. 191; Monogr. (1947) 72. — *F. Korovinii* Pavl. in Izv. Mosk. obshch. isp. prir. XLII (1933) 129. — *Peucedanum karataviense* Rgl. et Schmalh. in Tr. Bot. Sada, V (1877) 598. — Ic.: Korov., Monogr. Table XV, Figure 1.

Perennial; root cylindrical, with spherical tuberous swellings, its neck covered with fibers of dead leaves; stems single, rarely 2–3, to 40 cm high, thin, corymbiformly branching above; leaves scabrous-hairy, persistent; radical leaves with expanded sheaths, without petioles, their blade triangular, multipinnatisect into small, linear or lanceolate acute, 5–10 mm long lobules, cauline leaves with reduced blade, upper represented by inflated, coriaceous, amplexicaul, swollen, lanceolate sheaths. Umbels variable, all stalked, 138 terminal of 3–10 rays, 7–8 cm across, lateral in whorls of 2–3; umbellets 5–10-flowered; flowers on long, thin pedicels; calyx edentulate; petals pale yellow with dark spot in middle, broadly oval, short-tapering, with inward curved tip, recurved 1.3 mm long; stylopodium flattened-conical with broadened lobate, slightly raised margin; mericarps ellipsoid, with narrow margin; dorsally inflated along ribs, 8 mm long, $\frac{1}{3}$ length of pedicels; canals broad, solitary in furrows, 2 toward commissure. Fl. May–June, Fr. June–July.

Stony slopes. — Centr. Asia: T. Sh., Syr D., Pam.-Al. Gen. distr.: Sinkiang (Kuldja). Described from Kara-Tau Range (near Ishtyube). Type in Leningrad.

91. *F. vicaria* Korov., Monogr. (1947) 72.

Perennial; root spherically thickened; stem single, ca. 20 cm high, thin, corymbiformly branching above, its neck covered with fibrous leaf remnants; leaves slightly scabrous, covered with short stiff hairs, persistent, stiff when dry; radical leaves with short petioles, their blade triangular, ternate, sections of first order multi-(3–4)-pinnatisect into spreading filiform, acute, curved lobules; cauline leaves almost reduced to cylindrical amplexicaul sheaths. Umbels of 2–4 rays; umbellets few-flowered; calyx edentulate; petals nearly flat, broadly oval, olive-brown, with whitish margin; mericarps not seen. June–July.

Stony slopes in lower mountain belt. — Centr. Asia: T. Sh. (Fergana). Endemic. Described from Sary-Tau Mountain. Type in Tashkent.

Subgenus 6. *Dorematoides* (Rgl. et Schmalh.) Korov., Monogr. (1947) 10. — Group of *E. dorematoides* Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 593. — Similar to preceding group, except for umbels which are pierced and apparently simple, as in *Dorema*. Mono-polycarpic herbs, covered with soft hairs; leaves mostly finely lobular. Polyphyletic group, far removed from *Dorema*. Six species distributed in deserts and in hot lower mountain belt.

92. *F. schtschurowskiana* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestv. antrop. i etnogr. XXXIV, 2 (1882) 34; Korov., Monogr. (1947) 77. — *Dorema serratum* Aitch. et Hemsl. in Trans. Linn. Soc. London, III (1888) 70. — *D. Schtschurowskianum* K.-Pol. in Bot. mat. gerb. Glav. Bot. Sada, II (1921) 88. — Ic.: Aitch. et Hemsl. l. c. tab. 28.

Perennial; root cylindrical, intermittently thickened, its neck covered with brown fibers; stem 1 m and higher, pale yellow, cylindrical with spreading branches above; branches alternate, upper in groups; leaves mostly in lower part of stem, pale green, wilting, glabrous or slightly hairy beneath; lower leaves short-petiolate, with petiole expanded to sheath, their blade triangular, ternately dissected, with oval or oval-oblong, secund-decurrent, finely and acutely serrate lobules asymmetrical at base, to 12 cm long, 6 cm wide; cauline leaves reduced to inflated, sometimes ovoid, coriaceous, amplexicaul acuminate sheaths. Umbels of 1-5 rays, becoming thick, of different length, 2-4 cm long; umbellets without involucre, 10-flowered; calyx with short fleshy teeth; petals yellow, elliptic, acuminate, with inward curved tip, 1.2 mm long; stylopodium broadened, flat, lobate, becoming ampullaceous; styles elongate; stigmas capitate; mericarps pale yellow, plano-compressed, elliptic, with narrow margin, 10 mm long, 6 mm wide, twice as long as pedicels; ribs filiform; canals narrow, 3-5 per furrow, 8-10 toward commissure. Fl. May, Fr. June. (Plate XVII, Figure 2.)

Deserts and semideserts. — Centr. Asia: Kyz. K., Kara-K., Balkh. (SW), Mtn. Turkm. (Badkhyz), Pam.-Al. Gen. distr.: Afghanistan. Described from Kyzyl-Kum. Type in Leningrad.

93. *F. ferulaeoides* (Steud.) Korov., Monogr. (1947) 77. — *F. resinosa* Sievers in Pall. n. nord. Beitr. VII (1796) 260, nom. nud. — *F. paniculata* Ldb. Fl. Ross. II (1844) 305; Kryl., Fl. Zap. Sib. VIII, 1994. — *Peucedanum paniculatum* Ldb. Fl. alt. I (1829) 310, non Lois. (1807). — *P. soongoricum* G. Don, Gen. Syst. III (1834) 332, non *Ferula soongorica* Pall. (1820). — *P. feruloides* Steud. Nomencl. ed. 2, II (1841) 311. — *P. pyramidatum* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 366. — Ic.: Ldb. Ic. pl. Fl. Ross. II, tab. 199; Korov., ibid. Table XLIII, Figure 1.

Perennial; root fusiform, often swollen, ovoid, its neck covered with fibers and remnants of dead leaves; stem thick, ca. 1 m high, branching from middle to produce pyramidal panicle; all branches in whorls; leaves soft, soon wilting, densely and softly pubescent, canescent; radical leaves with petiole passing into broad sheath, their blade triangular-oval, ternate, sections of first order multi-(4)-pinnatisect into small, more or less oval, to 10 mm long sections pinnatifid or parted into entire or dentate lobules; cauline leaves with obsolete [blade], upper reduced to soft, flat, semiamplexicaul, triangular-lanceolate sheath. Umbels equal, simple, of 3-8 rays, overlapping, in groups of 3-4; umbellets 10-flowered, with involucre of few squamiform deciduous leaflets; flowers on thin pedicels; calyx-teeth short; petals yellow, oval, acuminate above, curved inward; stylopodium flattened-conical, with thickened, broadened, undulant margin; mericarps plano-compressed, elliptic, with narrow margin, 6-7 mm long; ribs filiform; canals narrow, solitary in furrows, 2 toward commissure. Fl. May, Fr. June. (Plate XIV, Plate XVII, Figure 1.)

Wormwood, solonetzic semideserts. — W. Siberia: Irt.; Centr. Asia: Ar.-Casp., Balkh., T. Sh. (Chu-Ili Mountains). Gen. distr.: Sinkiang. Described from Siberia. Type in Leningrad.

Economic importance. The large radical leaves of this species of *Ferula* are fed to cattle and are of value as concentrated fodder, after

being picked by hand and dried in the sun. Camels readily eat the hay but horses hardly at all. Cattle, goats and sheep eat the hay only when it is mixed with grasses, with *Ferula* not exceeding 30% of the mixture. Chemical analysis of absolutely dry matter revealed 12–13% protein and some (15–22%) cellulose. The fruit contains 21.8% albumen and 22.8% cellulose. No resins were found in the leaves. In the laboratory of the Botanical Institute of the Academy of Sciences of the USSR it was found that the roots (dry weight) contained 5.8–8.1% sugar, 34.2–36.9% starch, 15.12–17.87% cellulose, 1.6–1.72% nitrogen, 33–35% resin, 2.17% essential oil, and 4.25–6.64% ash. The resin is of great value in industry (plastics). The essential oil consists of sesquiterpene alcohol ($C_{15}H_{26}O$) and low-boiling hydrocarbons.

94. *F. caucasica* Korov., Monogr. (1947) 78.

Perennial; stem thin, ca. 1 m high, robust, furrowed, faintly violet at fruiting, paniculately branching from middle or above; branches alternate below, whorled above, with short lateral branchlets; leaves soft, glabrous on both sides, pale green, their blade oval, quadripinnatisect, its sections oval, pinnatifid into linear-lanceolate, acute, 2–4 mm long lobules; upper leaves obsolete. Umbels equal, 2–4, overlapping, of 4–6 rays, without involucre, rays spreading, ca. 3 cm long; flowers not seen; mericarps dark red, elliptic, plano-compressed, 9 mm long, slightly longer than thin pedicels; ribs filiform, slightly protruding; canals narrow, 1 per furrow, approximate, 4 toward commissure. Fr. May.

Stony slopes in gorges. — Caucasus: Dag., E. Transc. Endemic. Described from Bozdag. Type in Leningrad.

- 141 95. *F. caspica* M. B. Fl. taur.-cauc. I (1808) 220; Ldb. Fl. Ross. II, 302; Grossg., Fl. Kavk. III, 178. — *F. aciphylla* M. B. ex Ldb. l. c. 303, nom. — *F. cachroides* Fisch. in Cat. Hort. Gorenk. (1812) 46, nom. nud. — *F. orientalis* Eichw. Skizze (1830) 156. — *Peucedanum caspicum* Link, Enum. hort. Berol. I (1821) 272. — Ic.: Korov., Monogr. (1947) Table XLIII, Figure 2.

Perennial; root thickened, often fusiform, its neck covered with fibrous remnants of leaves; stems single, rarely 2–3, ca. 30 cm high, thin, branching to produce panicle from middle or upper part; branches alternate, with short, lateral branchlets; leaves soon wilting, scabrous, covered with short stiff hairs; radical leaves with reduced petioles, their blade broadly rhombic, tripinnatisect into small oval segments parted or cut into narrow acute lobules; cauline leaves with reduced blade on lanceolate, more or less soft, wilting and often recurved sheath. Umbels sessile, in groups of 2–3, overlapping on branches, of 1–6 rays; umbellets without involucre, 8–10-flowered calyx edentulate; petals yellow, elliptic, acuminate and curved at midrib; stylopodium flattened-conical, with slightly thickened expanded margin; mericarps elliptic, plano-compressed, with narrow margin, 4–5, rarely to 9 mm long, about as long as pedicels, ribs filiform, slightly protruding; canals narrow, 1 per furrow, 2 toward commissure. Fl. May–June, Fr. June–July. (Plate XV, Figure 2.)

Clayey and solonchak slopes and semideserts. — European part: Transv., L. V., Bl., Crim.; Caucasus: Cisc., E. Transc.; W. Siberia; U. Tob. (S.);

Centr. Asia; Ar.-Casp. Endemic. Described from specimens collected along the highway from Astrakhan to Kizlyar. Type in Leningrad.

96. *F. dshaudshamyr* Korov., Monogr. (1947) 79. — *F. Dubjanskii* Korov. in Izv. Sredneaz. Gos. univ. XX (1935) and in Pavl., Fl. Tsentr. Kazakhst. II (1935) 334, nom. nud. — *Dorema soongoricum* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 365. — Ic.: Korov., Monogr. Table XVI, Figure 1.

142 Perennial; root short, thickened, covered with thin rootlets below, its neck covered with numerous fibrous remnants of leaves; stem thin, erect, pale green, becoming violet, branching in middle part to produce sparse, ovoid or oblong panicle; branches alternate; leaves soft, persistent, glabrous above, canescent beneath, densely covered with short soft hairs; radical leaves with short petioles, their blade triangular-oval, sections of first order tripinnatisect into oval segments, these in turn pinnatipartite into small, oval, angularly toothed, 4–5 mm long lobules; cauline leaves almost reduced to coriaceous, lanceolate, amplexicaul sheaths, appressed to stem, densely covered outside with short, rapidly disappearing hairs, rarely hairs lacking. Umbels sessile, some overlapping, of 1–4, to 2 cm long rays thickening in fruit; umbellets 15-flowered; flowers short-pedicelled; calyx edentulate; petals yellow, elliptic, with short narrow inward curved tip; stylopodium flattened-conical with broadening, thickened, undulant margin; mericarps ellipsoid, dorsally slightly inflated, with narrow pale margin, 6 mm long; ribs filiform, prominent; canals narrow, solitary in furrows, 2 toward commissure. Fl. June, Fr. July.

Sands, rarely rocky slopes. — Centr. Asia: Balkh., Ar.-Casp., Kyz. K. Gen. distr.: W. Mong. Described from Muyun-Kumy. Type in Tashkent.

Genus 1053. **SORANTHUS*** Ldb.

Ldb. Fl. alt. I (1829) 344; DC. Prodr. IV, 669

Calyx-teeth very short, acute; petals greenish, with inward curved lobule, hairy outside, long persistent in fruit; stylopodium flat, with dentate undulant margin; fruit lenticularly inflated, ellipsoid, dorsally flattened; mericarps with filiform, faintly protruding dorsal and winged lateral ribs, tightly adhering; canals 1 per vallecule, 4 toward commissure; carpophore bifurcate; albumen flat. Perennial herbs, with multipinnatisect leaves and linear-filiform lobules, flowers subsessile in dense, subcapitate inflorescences.

A monotypic genus, endemic to the Zaisan basin and adjacent riparian valleys.

1. *S. meyeri* Ldb. Fl. alt. I (1829) 344; Ldb. Fl. Ross. II, 271. — *S. peucedanifolius* Woron. in Fl. Yugo-Vost. V (1931) 823, non *Ferula peucedanifolia* Willd. (1820). — *S. sibiricus* Korov., Monogr. (1947) 81, non *Ferula sibirica* Willd. — ? *Ferula Meyeri* Bge. in

* From the Greek *soros* — bundle, *anthos* — flower.

Mém. sav. étr. Pétersb. VII (1851) 307. — *F. capillifolia* Stschegl. in Bull. Soc. Nat. Mosc. XXVII, 1 (1854) 168; Kryl., Fl. Zap. Sib. VIII, 1411. — ? *F. Pallasii* K.-Pol. in Izv. Voronezhsk. obshch. estestvoisp. I (1925) 37, in Note. — *F. peucedanifolia* Kryl., F. Zap. Sib. VIII, 1997, non Willd. — Ic.: Ldb. Icon. pl. fl. Ross. I, tab. 82.

- 143 Perennial; entire plant glabrous, glaucescent; root fusiform, 0.5 cm thick, its neck covered with fibrous remnants of leaves; stem 45–120 cm high, erect, rounded, furrowed; radical leaves with 3–7 mm long petioles, persistent at flowering, passing into oblong sheath appressed to stem, tripinnate, 12–25 cm long, with opposite petioluled lobes, only tertiary sessile, lobules of last order linear-filiform, thinly acuminate, entire, rarely tridissected, 1.5–5 cm long, 1.5–2 mm wide; cauline leaves 1 or 2, smaller and less dissected, with amplexicaul sheath. Umbels semi-spherical, at tips of stem and (usually) in whorls below apex of stem, rather strongly spreading; main umbel ca. 8 cm across, of 10–15 smooth rays, lateral umbels of 4–8 rays, 3–5 cm across; involucre lacking or of 1 leaflet; umbellets dense, globular-capitate, leaflets of involucels 6–8, ovate or ovate-lanceolate, acuminate, hairy outside with ciliate margin, 2 mm long; central flowers in umbellets staminate, median bisexual, peripheral pistillate; calyx-teeth short, acute; petals greenish, broadly ovate, short-haired outside; ovary and young fruit covered with bristles, ripe fruit glabrous, ellipsoid, 15–16 mm long, 7–8 mm wide, on thickened pedicels $\frac{1}{4}$ – $\frac{1}{3}$ length of fruit. Fl. May. (Plate XXIII, Figure 7.)

Sandy hills. — W. Siberia: Irt. (SW); Centr. Asia: Balkh. (Zaisan basin). Endemic. Described from sands of the Irtys and Bukon rivers. Type in Leningrad.

Note. The synonymy of this plant is very confused. Voronov ("Fl. Yugo-vostoka") gave priority to *Soranthus peucedenifolius* (Willd.) Woron., but *Ferula peucedanifolia* has been described from the lower reaches of the Volga where, as is commonly known today, *Soranthus* does not occur. E. Korovin proposed *S. sibiricus* (Willd.) Korov., based on *Ferula sibirica* Willd., also occurring in the lower reaches of the Volga. In 1829 Ledebour described *S. meyeri* from the sands of the Irtys River, and this is indeed the correct name for the narrowly endemic Irtys-Zaisan plant. The meaning of *Ferula peucedanifolia* Willd. and *F. sibirica* Willd. remains vague.

Genus 1054. **LADYGINIA** * Lipsky

Lipsky in Tr. Bot. Sada, XXIII, 1 (1904) 150

- 144 Calyx-teeth short-subulate; petals yellowish, lanceolate, with short inward curved lobule; stylopodium pulviniform with undulant-plicate margin; fruit compressed dorsally, with unthickened, whitish, winged margin; dorsal ribs filiform, marginal close to whitish margin; canals obscure. Tall perennial herbs, with large ternate-pinnate leaves.

Monotypic genus, endemic to Pamir-Alai and Kugitang.

* After V.F. Ladygin, who assembled a valuable collection of plants in Central Asia.



PLATE XVI. 1 — *Ferulago silvatica* (Bess.) Rchb.; 2 — *F. taurica* Schischk.

1. *L. bucharica* Lipsky in Tr. Bot. Sada. XXIII, 1 (1904) 150. — *Ferula bucharica* K.-Pol. in Vestn. Tifl. Bot. sada, XI (1916) 137, 166. — Ic.: Lipskii, l. c. Table IX.

Perennial; root thick, its neck covered with brown fibrous remnants of radical leaves; stem 100–150 cm high, erect, branching, cylindrical, thinly furrowed, glaucescent-green, with short-stiff-haired leaves, becoming subglabrous; radical and lower cauline leaves broadly ovate, 30–40 cm long, ca. 25 cm wide, biternate, their more or less long petioles expanding to sheath; terminal lobules petioluled, broadly ovate, cordate or truncate with large unequal obtuse teeth, 4–12 cm long, 3–11 cm wide, upper leaves smaller, sessile on inflated sheath, uppermost leaves with reduced blade or of inflated swollen sheath only. Umbels of 20–25 smooth rays, 40 cm across, involucre and involucels lacking; petals brownish yellow, hairy outside; stylopodium short-conical, with broad, cup-shaped base and slightly undulant upward curved margin; styles divergent, twice as long as stylopodium; fruit ovoid, 20 mm long, 10 mm wide, marginal wings ca. 2.5 mm wide. Fl. May–June, Fr. June–July.

Slopes and stony taluses, 600–1,800 m. — Centr. Asia: Pam.-Al. Endemic. Described from High Mountain Tadzhikistan. Type in Leningrad.

Genus 1055. **ERIOSYNAPHE*** DC.

DC. Mém. V (1829) 50

147 Calyx-teeth short, obtuse; petals oval, entire, with short inward curved tip, greenish yellow; fruit oval-oblong, laterally compressed, and downy-tomentose commissural face; dorsal ribs filiform, marginal thickened; canals 3–4 in valliculae, lacking at commissure. Perennial herbs, with tripinnatisect leaves and long, linear, terminal lobes.

Monotypic genus, nearly endemic to the southeastern region of the European part of the USSR.

1. *E. longifolia* (Fisch.) DC. in Mém. V (1829) 50; Prodr. IV, 175; Fisch. et Mey. in Ind. sem. Hort. Petrop. V (1839) 35, in nota; Ldb. Fl. Ross. II, 307. — *E. cachroides* K.-Pol. in Izv. Mosk. obshch. ispyt. priro. XXIX (1915) 127. — *Ferula longifolia* Fisch. in Cat. Horti Gorenk. (1812) 45, nom. nud.; Spreng. Umbellif. Spec. (1813) 86; Shmal'g, Fl. I, 407. — *F. cachroides* (anonym?) Catal. Horti Orloviens. (1811) 18. — *Johrenia longifolia* Calest. in Webbia, I (1905) 224. — Ic.: DC. l. c. (1829) tab. I, f. E; Fl. Yugo-Vost. V, Figure 536.

Perennial; root ca. 1 cm thick in upper part, its neck densely covered with brown fibrous remnants of petioles; stem 60–70 cm high, cylindrical, thinly ribbed, 7–8 mm thick, branching from middle, glabrous radical leaves broadly triangular, tripinnatisect, glabrous, their petioles shorter than blade, blade 15–18 cm long, nearly as wide; terminal lobes linear, 3–8 cm long, 1–4 mm wide; upper leaves reduced to oblong, slightly inflated, amplexicaul sheath. Umbels of 5–9 long glabrous rays; terminal umbel

* From the Greek *erion* — wool, *synaphe* — commissure, point of contact.

larger than others, to 20 cm across; lateral umbels overtopping it, of 5–6 rays, sterile; involucre and involucels lacking; umbellets 6–15-flowered; petals yellow; pedicels 2–4 times as long as fruit, fruit dorsally compressed, ovate, 7–8 mm long, ca. 4 mm wide, with 3 acute dorsal and broadened (?) dentate lateral ribs; mericarps concave [?], tomentose at commissure. June.

Calcareous and clayey slopes, pebbly and clayey steppes. — European part: Transv., V.-Kama (S.), L. Don, L. V.; W. Siberia: U. Tob. (SW); Caucasus: Cisc.; Centr. Asia: Ar.-Casp. (N.). Endemic. Described from Sarepta (Krasnoarmeisk). Type in Geneva.

Genus 1056. **SCHUMANNIA** * Kuntze

Kuntze in Tr. Peterb. bot. sada, X (1887) 192

148 Calyx-teeth lanceolate, elongating after flowering; petals yellowish, obovate, with inward curved tip, hairy outside; fruit markedly compressed dorsally, broadly ovate or oblong, covered with short dense hairs; stylopodium conical, with broadened undulant base; styles recurved, twice as long as stylopodium; mericarps with obscure filiform ribs and thickened margins; canals 3 under valliculae; albumen flat; carpophore bipartite. Perennial herbs with tuberiform, thickened roots and ternate-pinnate leaves with long terminal lobules.

Monotypic genus, in the deserts of Central Asia, Kuldja and Iran.

1. *S. karelinii* (Bge.) Korov., Monogr. (1947) 81. — *Ferula karelinii* Bge. in Mém. sav. étr. Acad. Pétersb. VII (1851) 306. — *Ferula peucedanifolia* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 365, non Willd. — *Schumannia turcomanica* Ktze. in Tr. Peterb. bot. sada. X (1887) 192.

Perennial; root long, deeply rooted in soil, with 1 or several tuberiform thickenings 1–5 cm long, 0.6–2 cm across; stem single 20–60 cm high, glabrous, glaucous, thinly ribbed, usually with spreading whorled branches in upper half; radical leaves with long petioles gradually passing into long, slightly expanded sheath; leaf blade glabrous, obtriangular or broadly ovate, 8–40 cm long, 6–30 cm wide, bi- or triternate-pinnate, lobules of the last order linear, acute; 2–20 mm long, 0.5–1 mm wide, straight or falcately curved; petioles and leaf lobes with prominent narrow white nerves. Umbels of 5–15 glabrous, nearly equal rays with the same white striae as leaves, 3–10 cm across, involucre absent; umbellets very small, 4–7 mm across, with subsessile flowers crowded in head; involucels of 7–9 lanceolate or ovate-lanceolate, thinly acuminate, pubescent leaflets with scarious margin; calyx-teeth lanceolate, white-scarious in fruit; petals greenish or greenish violet, dorsally stiff-haired, ca. 1 mm long; fruit broadly ovoid, 10–15 mm long, 7–8 mm wide, densely pubescent; stylopodium conical, with broadened undulant base; styles recurved, twice as long as stylopodium. Fl. May–June, Fr. July. (Plate VI, Figure 2, Plate XXIII, Figure 3.)

* After Karl Schumann, curator of the Botanical Museum in Berlin.

Hummocky sands, stony-sandy and clayey-solonchic deserts, saxauls. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Amu D., Sur D. Gen. distr.: Iran., Sinkiang (Kuldja). Described from Kara-Kum. Type in Leningrad.

Economic importance. The tuberiform roots are eaten by the local population.

149 Genus 1057. **KOMAROVIA** * Korov.

Korov. in Sborn. K semidesyati letiyu so dnya rozhdeniya V. L. Komarova (1939) 427

Flowers bisexual, calyx-teeth inconspicuous; petals yellow, obovate, with inward curved tip; stylopodium short-conical, with lacinate margin; styles deflexed; fruit dorsally compressed; mericarps asymmetrical, one with 3 the other with 4 primary ribs, with narrow commissure; dorsal ribs filiform, marginal acute, containing 1 canal each; albumen deeply notched. Tall perennial herbaceous plants, with biternate, multipinnate large leaves.

Monotypic genus recorded from Pamir-Alai and the Kashka-Darya River valley.

1. *K. anisopterum* Korov. l. c. (1939) 430. — Ic.: Korov., *ibid.*, Figures 1, 2, 3 (flowers and fruit) and 4 (sections of pericarp).

Perennial; entire plant glabrous; stem 2–3 m high, to 10 mm [sic!] thick, cylindrical, branching in upper part; radical leaves large, with short petioles, multipinnatisect lobules of last order lanceolate, tapering at both ends, acuminate above with hardly revolute margins, 4–5.5 cm long, ca. 10 mm wide; upper cauline leaves reduced to lanceolate sheaths. Umbels of 2–7 thin, glabrous, 1.5–6 cm long rays; involucre and involucels absent; umbellets spherical, 10–12 mm across; petals yellow, obovate, 1.5 mm long; fruit oblong-ovoid, 10 mm long, 5 mm wide, slightly tapering at apex, reddish brown. Fl. June, Fr. August.

Deep, moist gorges, 1,000–1,500 m. — Centr. Asia: Syr D., Pam.-Al. Endemic. Described from Kashka-Darya and Zeravshan. Type in Tashkent.

Genus 1058. **FERULAGO** ** Koch

Koch in Nov. Act. Nat. cur. XII (1824) 97

150 Flowers polygamous; calyx with 5 inconspicuous teeth; petals yellow, subrounded, with inward curved tip; fruit dorsally plano-compressed with thin or more or less thickened margin. Mericarps with 3 prominent dorsal ribs obtuse at middle, sometimes winged, rarely filiform, 2 marginal ribs with narrow or broad, flat, winglike thickenings. Perennial herbs, with branching stem and multipinnatisect leaves with narrow terminal lobules.

* After the noted Soviet botanist, Academician V. L. Komarov (1869–1945).

** From *ferula* (see page 44), and the suffix "ago" — proximity.

To 50 species, in the Mediterranean region, Southeastern Europe and Asia Minor, to Iran and Turkmenia.

1. Stem very short-velutinous, pubescent below; leaves scabrous-hairy 7. *F. turcomanica* Schischk.
- + Stem and leaves glabrous 2.
2. Radical leaves lanceolate or lanceolate-ovate, 2–4.5(7) cm wide 3.
- + Radical leaves broadly triangular or ovate, 10–45 cm wide. 4.
3. Lobules of last order setaceous, 5–12 mm long; leaflets of involucels obliquely antrorse, small; dorsal ribs narrowly winged (Caucasus) 5. *F. setifolia* C. Koch.
- + Lobes of last order linear, awned-acuminate, 3–5(8) mm long; leaflets of involucels usually recurved, $\frac{1}{2}$ or $\frac{2}{3}$ length of umbellet rays; dorsal ribs filiform (southwestern European part of the USSR) 6. *F. silvatica* (Bess.) Rchb.
4. Leaflets of involucels long-acuminate, nearly as long as umbellet rays (Artvin) 4. *F. latiloba* Schischk.
- + Leaflets of involucels not as above, usually shorter than umbellet rays 5.
5. Lobes of last order short, 2.5–6 mm long 3. *F. taurica* Schischk.
- + Lobes of last order 6–12 mm long 6.
6. Fruit oblong-obovate, 12–20 mm long, 7–9 mm wide (southern European part of USSR) 1. *F. campestris* (Bess.) Grec.
- + Fruit subglobular, 8–9 mm long, 7–8 mm wide (Dagestan) 2. *F. daghestanica* Schischk.

Section 1. EUFERULAGO Boiss. Fl. or. II (1872) 996. — All canals nearly equal; leaves with strongly dissected lobules at base of primary lobes.

Series 1. Macrophyllae Schischk. — Dorsal ribs filiform. Radical leaves broadly triangular or ovate-oblong, 7–45 cm wide.

1. *F. campestris* (Bess.) Grecescu, Conspect. Flor. Romanei (1898) 252. — *Ferula campestris* Bess. Enum. Pl. Volhyn. (1822) 44. —
- 151 *F. nodiflora* M. B. Fl. taur.-cauc. I, 220, non L. (1753), nec Scop. (1772). — *F. Ferulago* Schmalh. Fl. Sr. i Yuzhn. Ross. 1, 405, non L. — *Ferulago sulcata* Ldb. Fl. Ross. II (1844) 299, pl. cauc. excl. non *Ferula sulcata* Desf. — *Ferulago galbanifera* Boiss. Fl. or. II, 997 ex parte, non *Ferula galbanifera* Mill. (1768).

Perennial; root thick, its neck covered with fibrous remnants of leaves; stem erect, 0.75–2 m high, ribbed, leafy below, nearly leafless above, strongly branching; leaves ovate-triangular, multipinnatisect, lower 30–60 cm long, petiolate, upper subsessile, less dissected; lobes of last order narrowly linear, with short mucro, 8–13 mm long. Central umbel larger than others, 6–18 cm across, with smooth rays, bisexual, lateral umbels in whorls, smaller, often staminate; involucre of 5–6 oblong-linear, recurved leaflets with slightly scarious margins; umbellets ca. 10 mm across, of 10–12 rays; leaflets of involucels usually 5, narrowly ovate or oblong-lanceolate,

acuminate, recurved; petals yellowish, subrounded, inward curved, slightly unequally toothed near apex; fruit oblong, obovoid, 12–20 mm long, 7–9 mm wide, tapering above and below, reddish-brown, somewhat glossy, with 3 filiform dorsal ribs. June–July.

Thinned-out forests, shrubby formations, steppes, rarely stony slopes. — European part: U. Dns., Bes., Bl., U. Dnp., L. Don, L. V. (Astrakhan, Stepnoi); Caucasus: Cisc. Gen. distr.: Bal., Centr. Eur. Described from Volyn. Paratype in Leningrad.

Note. One of the most widespread species of *Ferulago* in the USSR, usually determined as *Ferulago nodiflora* (L.) Koch. Linnaeus described it as *Ferula nodiflora* from Istria, subsequently mentioned in *Fl. carniolica* Scopoli, 1772, ed. 2. Boissier (*Flora orientalis* (II, 997)) accepted *Ferulago galbanifera* Koch, based on Miller's (1768) species, for the plant from Sicily and Italy (Hort. Clifford). Boissier's description seems to apply to several species (*F. campestris* Bess., *F. taurica* Schischk. and *F. daghestanica* Schischk.). In 1898 Grecescu restored Besser's (1822) forgotten *Ferulago campestris* (Bess.) Grecescu. We agree with Besser that the plant growing in the southwestern USSR is a distinct species.

2. *F. daghestanica* Schischk. in Bot. zhurn. SSSR, XXXI, No. 6 (1946) 8.

- 152 Perennial; stem 30–70 cm high, slightly ribbed, glabrous, branching above or nearly from middle; radical leaves ovate-oblong, 30–40 cm long, 7–8 cm wide, multipinnatisect, their petioles nearly as long as blade or longer, with narrow linear terminal, 5–10 mm long, ca. 0.5 mm wide lobules with circinate margin, and short mucro. Terminal umbel usually larger than others, to 7 cm across; upper branches considerably overtopping terminal umbel; involucre of 5–7 ovate-lanceolate, acute, recurved leaflets; umbel rays 7–15, furrowed, glabrous; umbellets of 12 unequal rays; involucels of 5 lanceolate, acute, antrorse or recurved leaflets; petals subrounded, yellowish brown when dry; stylopodium flat; fruit broadly ovoid, 8–9 mm long, 7–8 mm wide, with 3 prominent ribs and broad flat margin. Fl. July, Fr. September.

Dry slopes, roadsides. — Caucasus: Dag. (Dyuruk, Makhach-Kala, Alty-Buyun, Chir-Yurt). Endemic. Described from Chir-Yurt. Type in Leningrad.

3. *F. taurica* Schischk. in Bot. zhurn. SSSR, XXXI, 6 (1946) 3. — *F. galbanifera* β . *brachyloba* Boiss. Fl. or. II (1872) 997. — *F. nodiflora* var. *brachyloba* Thell. in Hegi, III. Fl. V, 2 (1926) 1359.

Perennial; root thick, 1–1.5 cm across; stem vertical, 30–100 cm high, branching in upper half, with glabrous leaves; radical leaves long-petioled, 20–50 cm long, 15–20 cm wide, multipinnatisect; terminal lobules narrowly linear, usually very short, 2.5–6 mm (rarely to 12 mm) long, very short-mucronate. Terminal umbel 10–12 cm across, of 10–22 smooth rays, lateral umbels in whorls, smaller; involucre of 5–12 broadly linear or oblong, recurved, acuminate leaflets; umbellets 7–15 mm across, of 10–12 unequal rays; involucels of 5–6 lanceolate, acute, recurved or antrorse leaflets; fruit ovoid, 12–15 mm long, 7–8 mm wide, with 3 prominent, thickish, median and narrow flat lateral ribs. Fl. July, Fr. September. (Plate XVI, Figure 2.)

Stony and dry slopes, thinned-out forests. — European part: Crim. (southern coast and near Simferopol). Endemic. Described from Uchan-Su. Type in Leningrad.

4. *F. latiloba* Schischk. in Bot. zhurn. SSSR, XXXI, 6 (1946) 9.

Perennial; stem ca. 1 m high, robust, glabrous, 7–8 mm across, with numerous protruding ribs; leaves multipinnatisect, radical broadly triangular, ca. 35 cm long, 40 cm wide, on ca. 12 cm long petioles; lobes of last order lanceolate or ovate-lanceolate, with circinate margin, slightly glaucescent, 3–6 mm long, 1.5–1.8 mm wide, with short mucro; cauline leaves uniformly spaced on stem, smaller, lower with long petioles, upper sessile; stem branching above with short solitary, paired or whorled, obliquely antrorse branches subtended by entire, ovate-lanceolate or dentate-incised leaves similar to but larger than leaflets of general involucre. Terminal umbel surrounded by whorled branches, terminated by smaller umbels which considerably overtop it; involucre of 7–8 ovate, acute, entire, spreading or retrorse leaflets; umbel rays unequal, glabrous, ribbed; umbellets ca. 12 mm across, with unequal rays; leaflets of involucels usually 5, ovate-lanceolate, long-acuminate, nearly as long as umbellet rays; petals subrounded, whitish-brownish; fruit unknown. August.

Bluffs. Occurs near Artvin, as yet unknown from the USSR. Endemic. Described from near Artvin. Type in Leningrad.

Series 2. *Setifoliae* Schischk. in Bot. zhurn. SSSR, XXXI, 6 (1946) 9. — Dorsal ribs thickish, spongy. Leaf lobes setaceous.

5. *F. setifolia* C. Koch in Linnaea, XVI (1842) 358; Ldb. Fl. Ross. II, 299; Boiss. Fl. or. II, 999; Grossg., Fl. Kavk. III, 179. — *F. oxyptera* Boiss. in Ann. sc. nat. sér. 3, 1 (1844) 320. — *Lophosciadium setifolium* C. Koch in Linnaea, XIX (1846) 39. — *Ferula setifolia* C. Koch l. c. (1846). — *F. sylvatica* Szov. ex C. Koch, l. c. (1846) non Bess.

Perennial; entire plant glabrous, green; root thick, vertical, its neck densely covered with remnants of leaves; stem 20–60 cm high, erect, thinly ribbed, slightly angled; leaves generally narrowly lanceolate, radical with more or less long petioles, 20–30 cm long, 2–4 cm wide, multipinnatisect; lobules of last order setaceous, canaliculate, acuminate, 5–12 mm long; cauline leaves smaller, with shorter petioles; uppermost leaves sessile, small (1–2 cm). Main umbel large, bisexual, 6–10 cm across at flowering, lateral umbels smaller (2–3 cm across), staminate; involucre of main umbel of 10–15 oblong-lanceolate, recurved, 10–12 mm long, ca. 2 mm wide, acuminate leaflets, sometimes dentate-incised, very narrowly scarious; involucre of staminate umbels of 4–5 smaller leaflets; leaflets of involucels 5, lanceolate, greenish-whitish, sometimes nearly scarious, obliquely antrorse; fruit ellipsoid, 11–13 mm long, 6–7 mm wide, with 3 narrowly winged dorsal and 2 broad lateral ribs. July.

Mountain slopes, shrubby formations, small meadows in the middle of forests, margins of forests, to 2,000 m. — Caucasus: E. and S. Transc.

Gen. distr.: Arm.—Kurd. (Artvin, Oltu, Kars, Erzerum). Described from Karabakh. Type was in Berlin.

Series 3. *Silvaticae* Schischk. in Bot. zhurn. SSSR. XXXI, 6 (1946) 9. — Dorsal ribs thickish, spongy; leaf lobes linear.

6. *F. silvatica* (Bess.) Rchb. Pl. crit. IV (1826) 371; Ldb. Fl. Ross. II, 298. — *Ferula silvatica* Bess. Enum. pl. Volhyn. (1822) 44; Shmal'g., Fl. I, 405. — Ic.: Rchb. l. c. tab. 371.

Perennial; root thick, its neck covered with fibrous remnants of leaves; stem cylindrical, 0.6–1 m high, with few whorled branches above, like leaves glabrous; leaves lanceolate-oblong, lower 25–40 cm long, 3.5–4.5 cm wide, multipinnatisect into linear, awned-acuminate lobes of last order, 3–7 mm long. Main umbel 10–15 cm across, of 9–15 thinly ribbed glabrous rays; involucre of many, recurved, oblong-lanceolate leaflets; umbellets 7–17 mm across, of 15–17 sparse, slightly unequal, ribbed, smooth rays; involucels of 3–7 lanceolate or linear, usually recurved, acute unequal leaflets with narrow scarious margin, $\frac{1}{2}$ to $\frac{2}{3}$ length of umbellet rays; calyx-teeth inconspicuous; petals whitish-yellowish, with slightly brownish middle part, subrounded; fruit ellipsoid, 6–7 mm long, 4–5 mm wide, with 3 dorsal ribs. June–July. (Plate XVI, Figure 1.)

Meadows, thinned-out forests. — European part: Bes., U. Dns. Gen. distr.: Rumania. Described from Volhyn. Paratype in Leningrad.

Section 2. *ANISOTAENIA* Boiss. Fl. or. II (1872) 997. — Dorsal canals 4; primary lobes without basal lobules.

Members of section are confined to eastern part of the Mediterranean area with Crete as the westernmost limit of distribution (*F. thyrsiflora* (Sibth. et Sm.) Koch). Only *F. turcomanica* Schischk. occurs within the USSR.

7. *F. turcomanica* Schischk. in Bot. zhurn. SSSR. XXXI, 6 (1946) 10.

155 Perennial; root ca. 4 cm thick, its neck covered with black-brown remnants of leaves; stem 70–130 cm high, with alternate or opposite branches above or from middle, these thinly furrowed, like leaves glaucous, very short-velutinous-hairy or subglabrous below, glabrous above; leaves short-scabrous-hairy, broadly ovate, 30–40 cm long, 20 cm wide, with short petioles, multipinnatisect into linear, flat, 0.5–1.5 cm long, ca. 1 mm wide lobules with inrolled margins; uppermost leaves reduced to sheath. Umbels 3–4 cm across, of 7–14 smooth, unequal rays; involucre and involucels of 5–9 ovate, acuminate, short-scabrous-hairy recurved leaflets; calyx-teeth inconspicuous; petals yellowish-greenish; fruit broadly ovate, 7–8.5 mm long, ca. 4–5 mm wide, with slightly protruding dorsal rib and winged, ca. 1 mm wide, lateral ribs. June–July.

Stony slopes. — Centr. Asia: Mtn. Turkm. (Kopet Dagh). Endemic. Described from Germab. Type in Leningrad.

Genus 1059. **DOREMA** * Don**

Don, Edinb. Phil. mag. IX (1831) 46. — Diserneston Jaub. et Sp. III. Pl. or. (1842) 78

* Treatment by K. M. Korolev.

** From the Greek *dorema* — gift.

Flowers regular, bisexual and staminate, the bisexual on upper branches, the staminate on lower, rarely flowers mixed; involucre of few caducous leaflets, or lacking; calyx 5-toothed, indistinct; petals yellow, cream-colored or greenish yellow, nerve darker, ovate-elongate, with inward curved tip; stigmas truncate or thickened; stylopodium flat, fleshy with lobed broadened margin, becoming cup-shaped; ovary cylindrical, faintly ribbed. Fruit with free carpophore, dorsally plano-compressed, elliptic, with filiform protruding ribs, 2 lateral ribs fusing with unthickened, whitish margin; pericarp of 2 layers of tissue, inner layer small-celled in middle part, sometimes entire mesocarp collenchymatous; mestomes thin, of few vessels; resinous canals solitary in valliculae, rarely 3-4, 2-8 toward commissure, branching or discontinuous. Monocarpic plants, with simple lateral umbels.

Note. The taxonomic position of *Dorema* among the platycarpous Umbelliferae is determined by the arrangement of the mestomes in the fruit 156 and the inflorescences and their division. *Dorema Don* is like *Ferula* L., *Zozimia* Hoffm., *Pastinaca* L. and others in the marginal position of the lateral mestomes. It differs from them, as well as from other platycarpous genera by the small, simple umbels borne singly and in groups along the branches; the latter make it difficult to establish the relationship of the genus in the system of the family. The anatomy of the fruit is of little help. Examination of the pericarp reveals that there is no inner, fibrous layer, the so-called "hypendocarp" (Kozo-Polyanskii), so typical for the above-mentioned genera. The mesocarp of the species of *Dorema Don* is more or less homogeneous and parenchymatous, rarely of angular collenchyma. In this respect the genus stands by itself vis-a-vis Umbelliferae with fruits of a similar structure. Nevertheless *Dorema* most nearly resembles *Ferula* L., remote species of which are known to have a pericarp with a similar histological structure. Also, some species of *Ferula* L. have umbels disposed as in *Dorema Don* (see *Ferula*, page 62).

Dorema Don comprises 16 species sharing a common structure, but differing in characters secondary for the family of Umbelliferae. In the USSR, *Dorema* is distributed in the Caucasus and the southern parts of Central Asia; it also grows in Iran, Afghanistan and Baluchistan. Its northernmost representative (*D. microcarpum* Korov.) appears in Central Asia, its southern limit lies in Tien Shan.

Dorema is typical in arid conditions and most species occur in dry foothills and hills, some grow in deserts. They are confined to more or less fine earth or highly calcareous soils, often mixed with rock debris. One species, *D. sabulosum* Litv., is a typical psammophyte.

Species of *Dorema* are ephemeral plants which usually complete their growth toward the end of May, regardless of the environment. Observations in nature and in cultivation show them to be monocarpic. As in similar members of *Ferula* their life cycle is 5-7 years, 4 years of which are in the stage of rosette. In the absence of leaves the fruits ripen at the expense of reserves stored in the root which reaches a weight of 10 kg (*D. aitchisonii* Korov.). The plant is readily cultivated.

Economic importance. In former times some species of *Dorema Don* were officinal. The resins of *D. ammoniacum* Don are known in pharmacopoeiae as gum ammoniac and figure in recent surveys of plant substances. 157 Outside the Soviet Union the resin contains 72% of a natural resin, 0.3%

essential oil and 26% gum. The essential oil has the odor of *Angelica* and is devoid of sulfur. (For further details see *Ferula*, page 62.) The resins of *D. aitchisonii* Korov. are presumably indistinguishable from the products obtained in Iran (Dubianskii, 1918). *D. hyrcanum* K.-Pol. is the only species of the Russian flora which has been investigated. The resins are used by the local population as plasters to stop bleeding and to treat injuries in horses. The pith of *D. sabulosum* is believed to alleviate heart ailments. The water extract from the young shoots of *D. aitchisonii* Korov. is used to treat diseases of the stomach.

1. Umbels numerous, alternate, rarely in groups of 3, sessile or on pedicels to 1 cm long 2.
- + Umbels few, in whorls of 3-4 or more, their pedicels to 3 cm long ... 9.
2. Fruit large, to 15 mm long and 9 mm wide; resinous canals solitary in valliculae, 2 toward commissure, and 2 canals interrupted at middle or 4-6-8-branching 3.
- + Fruit small, to 8 mm long and 5 mm wide; resinous canals solitary in valliculae, 2 toward commissure 5.
3. Stems swollen at nodes and internodes; flowers pale yellow; ovary and umbel stalks white-tomentose; fruit with whitish margin to 2 mm wide; resinous canals at commissure 4-6-8-branching 1. *D. aitchisonii* Korov.
- + Stems without swelling; flowers greenish yellow or cream-colored; resinous canals 2 toward commissure and 2 interrupted canals at middle of commissure 4.
4. Ovary canescent, with 2 mm long styles; umbellets on thin pedicels to 10 mm long; leaf sections entire, to 12 mm long; branches slightly divergent 2. *D. sabulosum* Litw.
- + Ovary white-lanate, with short styles; umbels subsessile; leaf sections deeply parted into 2-5 oblong lobes; branches markedly divergent 3. *D. karataviense* Korov.
5. Leaves stiff-haired; terminal leaflets wide, decurrent; ovary pubescent 6.
- + Leaflets glabrous or subglabrous, ovoid-elongate, acuminate, narrowly decurrent or sessile; ovary glabrous 7.
- 158 6. Stems faceted above, pubescent; ovary conical below, broadening above; endocarp thin; resinous canals narrow 4. *D. gummiferum* (Jaub. et Sp.) K. Korol.
- + Stems rounded above, sparingly pubescent; ovary rounded, sub-globular, endocarp thick; resinous canals broad 5. *D. pruinatum* K. Korol.
7. Umbels 8-12-flowered, without involucre; fruit ellipsoid, flowers pale yellow 8.
- + Umbels 6-10-flowered, with involucre; fruit oblong; flowers golden yellow 9.
8. Leaf lobules broadly lanceolate or ovate, glabrous; stylopodium conical; fruit ellipsoid; resinous canals narrow. 6. *D. glabrum* F. et M.
- + Leaf lobules oblong or 2-3-segmented, hairy along margin and beneath; stylopodium nearly flat; fruit conical, tapering below, broadening above; resinous canals broad, raised on ribs 9. *D. namanganicum* K. Korol.



PLATE XVII. 1 — *Ferula ferulaeoides* (Steud.) Korov.; 2 — *F. stschurovskiana* Rgl. et Schmalh.; 3 — *Dorema sabulosum* Litw.

9. Ovary cylindrical, sparingly pubescent; fruit 8 mm long, 5 mm wide; resinous canals narrow, hardly visible at commissure
 7. *D. hyrcanum* K. + Pol.
 + Ovary globular, glabrous; fruit 4–6 mm long, 3 mm wide; resinous canals broad, distinct at commissure
 8. *D. microcarpum* Korov.

1. *D. aitchisonii* Korov. nom. n. — *D. ammoniacum* Aitch. in Trans. Linn. Soc. 2 ser. III (1888) 70, tab. 26–27, non Don. — Kandalkama (Turkmenian name).

Perennial; root radish-shaped, its neck covered with setaceous fibers of dead leaves; stem to 3 m high and 10 cm across at base, cylindrical, smooth below, furrowed above, slightly soft-haired, markedly swollen at nodes and internodes, light straw-colored or brownish when ripe, branching from middle; branches alternate or in groups of 2–4; radical leaves grayish-green, hairy beneath, blade broad, large, its sections to 9 cm long, 2.5 cm wide, oblong-lanceolate, short-petioled, sessile or obliquely decurrent, entire, sometimes 2–3-lobed; cauline leaves reduced to amplexicaul, 161 furrowed sheath to 14 cm long. Umbels 12–17-flowered, sessile; involucre of filiform leaflets; flowers sessile or on short stalks to 1 mm across, bisexual or staminate; calyx-teeth small, oblong-oval; petals pale green, hairy along nerves; stylopodium cup-shaped, inflated, slightly lobed; styles to 2 mm long, curved outward, stigmas truncate; ovary cylindrical, covered with flocculent hairs; fruit plano-compressed, elliptic, sparingly pubescent, to 12 mm long, 8 mm wide, its whitish, unthickened margin to 2 mm wide; ribs thin, filiform; resinous canals solitary in valliculae, interrupted, 4–6–8-branching or continuous at commissure, narrow. Fl. May, Fr. June.

Loess loams. — Centr. Asia: Kara K. (E.), Mtn. Turkm. (E. Kopet Dag). Gen. distr.: Iran (Afghanistan). Described from Er-Oilantuz. Type in Tashkent.

Economic importance. The resin of this species contains cetyl alcohol (Pigulevskii, 1938).

2. *D. sabulosum* Litw., Spisok rast. gerb. russk. flory VIII (1922) 2. — *D. ammoniacum* Borszc. in Mém. Acad. Sc. Pétersb. VII sér. III, No. 8 (1860) tab. III–IV–V, non Don.

Perennial; root radish-shaped, its neck covered with fibrous remnants of leaves; stem cylindrical, to 1 m high, 7 cm across, tapering, smooth at base, furrowed, brownish above, branching from middle; branches alternate, the upper approximate; radical leaves pale green, with gray-haired, furrowed, to 15 cm long petioles; leaf blade triangular, terminal leaflets lanceolate, decurrent, covered with short curly hairs beneath; cauline leaves reduced to short, appressed, semialexicaul, oblique, hairy sheath. Umbels 8–12-flowered, alternate, opposite, on hairy stalks to 1 cm long; involucre of filiform leaflets; flowers on thin stalks to 5 mm long, bisexual or staminate; calyx hardly visible; petals pale yellow or greenish, to 2.5 mm long; ovary cylindrical, pubescent; stylopodium patelliform; styles to 2 mm long, stigma truncate; fruit dorsally plano-compressed, to 15 mm long, 9 mm wide, slightly twisted, with whitish 1 mm wide margin; ribs filiform, the lateral disposed

along margin; resinous canals solitary in valliculae, 2 toward commissure, 2 interrupted at middle of fruit. Fl. April, Fr. May. (Plate XVII, Figure 3.)

Hummocky sands. — Centr. Asia: Kara K., Kyz. K. Endemic. Described from Repetek station. Type in Leningrad.

3. *D. karataviense* Korov. in Bot. Mat. inst. Bot. i Zool. AN UzSSR, XIV (1951).

162 Perennial; stem twisted in upper part, cylindrical-angular, densely branching, covered with white lanate hairs, long persistent; branches alternate, in upper part approximate, thickish, markedly divergent, slightly twisted, sparsely bearing umbellets from base up; leaves glabrous above, with sparse short hairs beneath, petiolate; petioles downy, blade ternate, its segments subsessile, oval, parted nearly to rhachis into oblong-oval, ca. 5 mm long, 2 cm wide lobules, lower of which sometimes cut to rhachis. Umbellets unevenly spaced, singly or approximate in pairs, on densely lanate stalks, not more than 5 mm long; flowers in umbellets 15, sessile on short, 1–2 mm long lanate stalks; petals ovate or oblong-ovate, with short inward curved broadened tip, subglabrous outside, 1.8 mm long; stylopodium flat, as wide as ovary; styles 0.7 mm long; ovary densely white-lanate; resinous canals broad, equal in valliculae, narrow toward commissure. June.

Dry slopes. — Centr. Asia: Syr D. Endemic. Described from Kara-Tau. Type in Leningrad.

Note. This species is close to *D. sabulosum* Litw. from which it is distinguished by the character of branching, dense pubescence, subsessile umbellets, smaller petals, shorter styles, as well as by its leaves.

4. *D. gummiferum* (Jaub. et Sp.) K. Korol. comb. n. — Diserneston *gummiferum* Jaub. et Spach, III. Pl. or. I (1842) 78, tab. 40. — Ic.: Jaub. et Sp. l. c.

Perennial; stem cylindrical, striated, light brown, branching; branches alternate or clustered in groups of 3–4; radical leaves grayish green, triangular, petioled; leaflets to 10 cm long, 2–3.5 cm wide, oblong-lanceolate, acuminate, sessile or decurrent, upper reduced to semiamplexicaul sheath very hairy at base. Umbels 8–15-flowered, alternate, opposite or in groups of three; involucre of few subulate leaflets, sessile or on short stalks covered with white hairs, glabrous in fruit; flowers bisexual or staminate; calyx-teeth inconspicuous; petals pale yellow, ovate-lanceolate, glabrous along nerves; stylopodium cup-shaped; styles thin, flat, curved beyond edge of ovary; ovary cylindrical, tapering below, very hairy; fruit ellipsoid, to 8 mm long, 4 mm wide, with narrow whitish margin. June.

Deserts. — Centr. Asia: Kara K. Gen. distr.: Iran. Described from S. Iran. Type in Paris.

5. *D. pruinatum* K. Korol. in Bot. Mat. inst. Bot. i Zool. AN UzSSR, XIV (1951). — *D. ammoniacum* Boiss. in herb. non Don.

163 Perennial; stem cylindrical, furrowed, sparingly pubescent, branching; branches alternate, sometimes approximate; radical leaves tripinnate-partite, petioled; leaflets lanceolate, oblique, sessile or obliquely decurrent, to 5 cm long, 1.5 cm wide, entire, sometimes 2–3-lobed. Umbels 5–8-flowered,

alternate or opposite, sometimes in groups of 3, sessile or on very hairy short stalks, with involucre; flowers sessile; ovary cylindrical, very hairy; stylopodium cup-shaped, lobed; styles curved outward; calyx obsolete; fruit oblong; ellipsoid, brown, hairy, to 7 mm long, 5 mm wide, with narrow, 0.3 mm, whitish margin; ribs thin, filiform; resinous canals narrow, solitary in valliculae, 2 toward commissure; entire plant covered with whitish bloom.

Deserts. — Centr. Asia: Kara K. Described from near Kyzyl-Arvat. Type in Tashkent.

6. *D. glabrum* Fisch. et Mey. Ind. sem. Hort. Petrop. (1835) 26; Ldb. Fl. Ross. II, 306; Boiss. Fl. or. II, 1009; Grossg., Fl. Kavk. III, 179.

Perennial; root thickened from neck and below, 5–6 cm across, its neck covered with fibers of dead leaves; stem cylindrical, branching from middle, furrowed, glabrous, brown in fruiting; branches alternate or in groups of 2–3; leaves glabrous, their glabrous petioles to 15 cm long; leaf blade tri-pinnatifid; leaflets ovate, acuminate, 3–6 cm long, 2 cm wide, sessile or decurrent; cauline leaves reduced to small, semiamplexicaul sheath. Umbels 8–12-flowered, without involucre, on glabrous, to 1 cm long pedicels, alternate, opposite or in whorls of 3–4; flowers bisexual or staminate, on 5 mm long stalks; calyx indistinct; petals pale yellow, ovate-elongate, mucronate, recurved, 1.5 mm long; stamens to 2 mm long; stylopodium conical patelliform with lobed margin; styles 1.5 mm long, curved outside; stigmas broadened, ovary cylindrical, glabrous; fruit ellipsoid, 5–8 mm long, 3–5 mm wide, glabrous, with whitish margin to 1 mm wide; ribs thin, filiform; resinous canals solitary in valliculae, 2 toward commissure.

Salt deserts. — Caucasus: S. Transc. Endemic. Described from near Nakhichevan. Type in Leningrad.

7. *D. hyrcanum* K.-Pol. in Bot. mat. gerb. Glavn. Bot. Sada, II, 16–17 (1921) 67, ex parte. — *D. aureum* Bornm. in Sintenis It. transcasp. pers. (1900–1901) 267, non Stocks (1852). — *D. glabrum* Aitch. in Trans. Linn. Soc. 2 ser. III (1888) 72, non Fisch. et Mey. — Ic.: Aitch. l. c. tab. 26–27. — Exs.: Sint. l. c. No. 435.

Monocarpic perennial; root radish-shaped, its neck covered with fibrous
164 remnants of leaves; stem cylindrical, furrowed, sparingly pubescent, brown at maturity, to 2 m high, 3–5 cm across, branching from middle; branches alternate or opposite, sometimes in groups of 3–4; radical leaves grayish green, sparingly pubescent, their pedicels hairy, to 20 cm long; leaf blade ternate-partite, segments bipinnatifid; leaflets 3–5 cm long, 1–2 cm wide, oblong-lanceolate, sessile or decurrent, entire or pinnatilobate, with 2–3 12 mm long, 4–5 mm wide lobules, pubescent beneath, glabrous above; cauline leaves reduced to short, furrowed, semiamplexicaul sheath, appressed below, divergent above. Umbels 5–12-flowered, on glabrous, to 1 cm long stalks, alternate, opposite or in groups of 3–4, with involucre; flowers bisexual or staminate, on thin, sparingly pubescent, to 3 mm long peduncle; petals golden yellow, 1.5 mm long; stylopodium slightly inflated, patelliform, lobed; ovary cylindrical, sparingly pubescent or subglabrous, weakly ribbed; fruit glabrous, 6–8 mm long, 4–5 mm wide, ellipsoid, brown, with narrow whitish margin; ribs thin, filiform; resinous canals solitary in valliculae, and 2 narrow, hardly visible ones toward commissure. May–June.

Steep stony slopes. — Centr. Asia; Mtn. Turkm. Endemic. Described from Syunt Mountain in Kopet Dagh. Type in Leningrad.

Economic importance. The resins of this species contain 0.5% essential oil, 90.6% natural resin and 8.9% residues. The essential oil may reach 1.4% and more (4.65%) (Kordishev, 1936). It contains acetic ester, lycanol, citronellol, sesquiterpene, ferulene, doremon ($C_{15}H_{26}O$), doremol and its acetic ester (Rutovskii, 1931). The roots contain up to 19% resins, which yield introcellulose lacquers of the coniferyl group (Vyshenskii, 1935).

8. *D. microcarpum* Korov. in Bot. mat. gerb. Inst. Bot. i Zool. AN UzSSR, VIII (1947) 6.

Monocarpic perennial; root radish-shaped, its neck covered with fibers of dead leaves; stem 1.5 m high, cylindrical, reddish at maturity, slightly hairy, 2 cm across, branching below middle; branches alternate, opposite, in groups of 3–4 above. Radical leaves grayish green, pubescent, on hairy furrowed petioles; leaf blade tripinnatifid, its sections 1.5–2 cm long, 4–6 mm wide, sessile or short-decurrent, obtuse, sometimes 2–3 lobed; cauline leaves reduced to short, very hairy, semiamplexicaul sheath appressed at base. Umbels 8–12-flowered, on 7 mm long pedicels, alternate or opposite, without involucre; flowers on glabrous peduncles to 3 mm long; 165 ovary glabrous, cylindrical or orbicular, faintly ribbed; stylopodium cup-shaped; styles 1–1.5 mm long, slightly flattened, recurved; stigma truncate; fruit glabrous, 4–5 cm long, 3 mm wide, ellipsoid, brownish, with narrow pale margin; ribs thin, filiform; resinous canals narrow, solitary in valliculae, 2 indistinct canals toward commissure.

Pebbly slopes. — Centr. Asia; T. Sh. Endemic. Described from near Dzhalal-Abad, Kara-Su River. Type in Tashkent.

9. *D. namanganicum* K. Korol. in Bot. Mat. Inst. Bot. i Zool. AN UzSSR, XIV (1951). — *D. songoricum* Fedtsch. in Tr. Pochv.-bot. eksp. II, vyp. 5 (1915) 88, non K. et K. — *D. hyrcanum* K.-Pol. in Not. Syst. Herb. Hort. Bot. Petrop. II, vyp. 16–17 (1921) 68 (p. p. quoad. pl. Knorringianam).

Monocarpic perennial; root radish-shaped, its neck covered with fibrous remnants of leaves; stem 1 m high, 1.5 cm across, cylindrical, striated, dark brown, glabrous, branching from second third up; branches alternate, rarely opposite or in groups of 3; radical leaves on petioles to 5 cm long; cauline leaves reduced to furrowed, semiamplexicaul sheath. Umbels 8–10-flowered, on glabrous, to 5 mm long pedicels, alternate, opposite or in groups of 3, without involucre; flowers bisexual or staminate, on peduncles to 3 mm long; calyx-teeth hardly visible; petals cream-colored, oblong-oval, to 1.5 mm long; stamens to 2 mm long; ovary cylindrical, glabrous; stylopodium nearly flat, patelliform, hardly extending beyond ovary; styles to 2 mm long, recurved; stigmas broadened; fruit 8 mm long, 4 mm wide, ovoid, broadening above, tapering below; ribs thin, filiform; resinous canals broad, solitary in valliculae, protruding above ribs, 2 toward commissure.

Pebbly soils. — Centr. Asia; T. Sh. Endemic. Described from near Namangan. Type in Leningrad.

Genus 1060. **OPOPANAX** * C. Koch

C. Koch in Nov. Act. Nat. cur. XII, 1(1824) 96

Calyx-teeth inconspicuous; petals yellow, ovate, with inward curved tip; stylopodium short-conical, with flat undulant margin; fruit ovate, dorsally compressed, with smooth, swollen margin; mericarps with thin ribs, the 166 dorsal equidistant, the lateral drawn back; valliculae (Soviet species) with 1 canal. Perennials with high stem (ca. 1 m) and bipinnate leaves.

Three species, in Transcaucasia, the Balkans, Asia Minor and Iran.

1. *O. armeniacum* Bordz. in Fedde, Repert. XXX (1932) 378. — *O. hispidum* Grossh., Fl. Kavk. III, 180, non Griseb. — *O. persicum* Grossh. l. c. non Boiss.

Perennial; root to 2 cm thick, its neck densely covered with dark brown, narrow, band-like remnants of leaves; stem 90–100 cm high, cylindrical in lower part, thinly ribbed, covered with whitish, retrorse, flattened or squamiform, dentate-incised, often irregularly branching or thin, linear-lanceolate, sometimes linear-filiform hairs, with 1 or 2 incisions, with 2–3 small divergent apical teeth, in upper half stem angular, glabrous, with whorled branches above; lower and median cauline leaves petioled, ovate, nearly bipinnatisect into stiffish, oblong-lanceolate or oblong, asymmetrical obtuse lobes with oblique base and short-decurrent outer margin, dentate or crenate with white hairs similar to those of cauline leaves; upper leaves reduced to oblong-linear sheaths with small, tripartite blade. Umbels of 6–10 glabrous rays; involucre of 1–4 linear or lanceolate, acute leaflets; involucels of 2–5 herbaceous, linear-oblong or lanceolate-linear, acute, persistent leaflets nearly as long as peduncles; petals ovate, with inward curved tip, golden yellowish (?); flowers polygamous-monoecious, bisexual in terminal, staminate in lateral umbels; fruit (young) elliptic, dorsally compressed, with thickened margin, 7 mm long, 5 mm wide; dorsal ribs thin, the lateral broadening; canals solitary in valliculae, 8–10 toward commissure. July.

Stony slopes. — Caucasus: S. Transc. (foothills of Alagez). Endemic. Described from Kyzyl Dag. Type in Kiev.

Genus 1061. **LASER** * * Borkh.

Borkh. ex Gaertn. Mey. et Scherb. Fl. Wett. I (1799) 244, 384

Calyx-teeth triangular, short; petals white or reddish, broadly lanceolate, 167 tapering to long claw, with acute inward curved tip; fruit oblong, flattened dorsally; mericarps with 5 thickish primary ribs, the marginal wider and less prominent than the dorsal, and 4 secondary ribs with 1 canal each; stylopodium conical; styles recurved, longer than stylopodium; albumen flat toward commissure. Perennial herbs with ternate-compound leaves.

Three species, in C. and E. Europe and SW Asia.

* From the Greek opos — juice, pan — all, and kos — medicinal juice, referring to juice obtained from the roots.

** Ancient Latin name for the resinous secretion of some Umbelliferae (see *Laserpitium*, page 279).

1. *L. trilobum* (L.) Borkh. Flora obern Catzenellenbogen (1795); Ej. in Gaertn., Mey. et Scherb. Fl. Wett. I (1799) 384; Thell. in Hegi, Illustr. Fl. Mitt.-Eur. V, 2, 1464; Kryl., Fl. Zap. Sib. VIII, 2085; Grossg., Fl. Kavk. III, 195. — *L. aquilegifolium* Roehl. ex Steud. Nom. ed. II, 2(1841) 10. — *L. carniolicum* Bernh. ex Steud. Nom. ed. II, 2(1841) 10. — *Laserpitium trilobum* L. Sp. pl. (1753) 248. — *Siler trilobum* Crantz, Stirp. Austr. ed. I, III (1762) 62; Scop. Fl. carn. ed. II, 1 (1772) 217; Ldb. Fl. Ross. II, 333; Boiss. Fl. or. II, 980; Shmal'g., Fl. 1, 414. — *Angelica aquilegifolia* Lam. Fl. Franc. III (1778) 452. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 1984 (1865); Fedch. and Fler., Fl. Evrop. Ross. (1910) 707. — Exs.: G. R. F. No. 1616.

Perennial; root ca. 1 cm thick, its neck covered with fibrous remnants of leaves; stem 60–150 cm high, like leaves glabrous, cylindrical, branching, thinly ribbed; radical leaves with long petioles, their blade 25–35 cm long and as wide, bi- and triternate, lobes of first order long-petioluled, of last order (leaflets) rounded, 5–10 cm long, 4–8 cm wide, green above, bluish-glaucous beneath, dentate, entire or 2–3-segmented or cut into large, obtusely toothed sections; upper leaves not as complex, with broad inflated sheaths. Umbels 22–25 cm across, on long peduncles, of 15–20 unequal glabrous rays; involucre lacking, involucels of 1–2 mm long, lanceolate, whitish leaflets; calyx-teeth distinct, triangular-ovate; petals white; fruit ellipsoid, smooth, 7–8 mm long, 4 mm wide. May–June.

Light forests, forest margins, shrubby formations, mainly on calcareous soil. — European part: Balt., U. Dnp., U. Dns., Bes., Crim., M. Dnp., Bl., V.-Don, V.-Kama, Transv.; Caucasus: Dag., E. and W. Transc. Gen. distr.: Atl. and Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Gurgan Mountain. Type in London.

Economic importance. When fresh the fruits contain 0.9%, the umbels 0.7% and the green parts 0.02% essential oil.

168 Genus 1062. **PEUCEDANUM*** L.

L. Sp. pl. (1753) 245. — *Imperatoria* L. Sp. pl. ed. I (1753) 371. — *Selinum* L. Sp. pl. ed. I (1753) 244 (nec ed. 1762). — *Oreoselinum* Adans. Fam. II (1763) 100. — *Cervaria* Gaertn. Fruct. (1788) 91. — *Thysselinum* Hoffm. Gen. Umbell. (1814) 154, non Adans. (1763) nec Moench (1794) 85. — *Ostrutium* Link, Handb. I (1829) 360. — *Petroselinum* Rchb. Fl. germ. excurs. (1832) 453. — *Caroselinum* Griseb. Spicil. Fl. rum. 1 (1843) 374, pro parte. — *Taeniopetalum* Vis. Fl. Dalmat. III (1849) 49. — *Macro-selinum* Schur in Verh. Siebenb. Ver. Naturw. IV (1853) 30. — *Schlosseria* Vacot. in Oesterr. Bot. Wochenbl. VII (1857) 350. — *Xanthoselinum* Schur, Enum. Pl. Trans. (1866) 264. — *Palimbria* DC. Prodr. IV (1830) 176, pro parte nec Bess. — *Calestania* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 175

Calyx-teeth short, often indistinct; petals white, greenish or yellowish, broadly ovate, emarginate, with narrow, inward curved tip; stylopodium thick, conical; styles recurved, nearly twice as long as stylopodium; fruit markedly compressed dorsally, narrowly or broadly elliptic, with paler, broad or narrow margin; mericarps with 3 approximate, faintly protruding, filiform

* From Dioscorides' *peukedanon*: from *peuke* — spruce, *danos* — dry, or from the Greek *peukedanos* — bitter, sharp, referring to the sharp taste and smell of the plant.

dorsal ribs, two of them tightly contiguous, slightly enlarged, with wing-like extensions; innermost layer of fruit wall often consisting of thick-walled radial cells; valleculeae with 1-3 canals close to external layer of pericarp, 2-4 canals toward commissure; albumen narrow in cross section, flattened; slightly concave toward commissure; carpophore bipartite to base. Perennial herbs, with compound, ternately or pinnately dissected leaves.

To 120 species almost throughout Europe and Asia, with the exception of the Arctic, and in southern and tropical Africa. The 78 North American species formerly included in *Peucedanum*, are now considered as belonging to *Lomatium* Raf.

1. Leaves ternate-compound, with linear, cylindrical or flat, entire terminal lobules, 2-13 cm long, 0.3-4 cm wide. 2.
- + Leaves simple or multipinnate, never ternate-compound, terminal lobules often dentate. 11.
2. Umbels of (3)5(7) rays; flowers subsessile; umbels crowded, capitate. 9. *P. magoltavicum* Korov.
- 169 + Umbels of 7-35 rays; flowers on distinct pedicels, not crowded. 3.
3. Involucels lacking (Talass Ala Tau). . . . 6. *P. renardii* Rgl. et Schmalh.
- + Involucels of 4-12 leaflets, always present. 4.
4. Main umbel of 30-35 rays; fruit 8-9 mm long; involucre of 2-4 leaflets (Siberia and N. Centr. Asia). 4. *P. morisonii* Bess.
- + Main umbel of 30-40 rays; involucre multifoliate (Transcaucasia). 4a. *P. luxurians* Tamamsch.
- ++ Main umbel of 7-30 rays; fruit 4-7.5 mm long. 5.
5. Umbels of 20-30 rays (Pam.-Al.). 8. *P. hissaricum* Korov.
- + Umbels of 7-20 rays. 6.
6. Terminal lobules cylindrical (Turkmenia). 7. *P. turcomanicum* Schischk.
- + Terminal lobules flat, never cylindrical. 7.
7. Fruit ovoid, twice as long as pedicels; lobules very narrow, 0.3 mm. 3. *P. calcareum* Alb.
- + Fruit ellipsoid or broadly ovoid, as long as or shorter than pedicels; lobules wider. 8.
8. Umbels of 7-10 rays, compressed in fruit. . . 32. *P. borysthenicum* Klok.
- + Umbels of 11-20 rays, not compressed in fruit. 9.
9. Plant 100-120 cm high; terminal lobules 4-9 cm long; fruit 6-7 mm long. 1. *P. ruthenicum* M. B.
- + Plant 40-80 cm high; terminal lobules 1.5-4 cm long; fruit 4 mm long. 10.
10. Umbels of 11-15 rays; involucre lacking (Centr. Asia). 5. *P. songoricum* Schischk.
- + Umbels of 17-20 rays; involucre of 3-5 leaflets. . . 2. *P. tauricum* M. B.
11. Involucre lacking or of 1-2 caducous leaflets. 12.
- + Involucre of two to many leaflets. 28.
12. Umbel rays scabrous along upper margin or entirely short-hairy. . . 13.
- + Umbel rays glabrous. 22.
13. Leaflet teeth terminated by long (2-4 mm) spine (Far East). 12. *P. eryngiifolium* Kom.
- + Teeth of leaflets (if present) obtuse or acute, sometimes with short mucro, not more than 1 mm long. 14.

14. Leaf lobes of the last order rhombic or elliptic, 3–10 cm long,
170 1–7 cm wide, nerves scabrous above or beneath. 15.
+ Leaf lobes of the last order ovate, oblong-lanceolate or linear,
nerves glabrous above or beneath 17.
15. Fruit ellipsoid-rounded, 4–5 mm long and nearly as wide;
nerves scabrous beneath (Baltic area) 27. *P. ostruthium* (L.) C. Koch.
+ Fruit ovoid or oblong, 5–7 mm long, 3–4 mm wide; nerves scabrous
above (Caucasus) 16.
16. Involucels of 2–3 setaceous leaflets 19. *P. caucasicum* (M. B.) C. Koch.
+ Involucels absent 20. *P. zedelmeyerianum* Mand.
17. Leaf blade geniculately recurved 15. *P. salinum* Pall.
+ Leaf blade erect 18.
18. Plant covered in lower half with short dense hairs 17. *P. puberulum* Turcz.
+ Plant glabrous 19.
19. Petals yellowish or greenish-whitish; involucels of 1–3 leaflets
(European part) 29. *P. podolicum* (Bess.) Eichw.
+ Petals white or reddish; involucels of 4–7 leaflets 20.
20. Stem not branching or with 1–2 branches above, glabrous below
inflorescence; marginal wings of fruit ca. 1 mm wide (Caucasus) . .
. 30. *P. pschavicum* Boiss.
+ Stem branching in upper half or from base, scabrous below
inflorescence; wings of fruit 0.4 mm wide (Siberia and Far East) . . 21.
21. Terminal leaf lobules lanceolate-linear, 2–10 mm long, ca. 1 mm
wide, with carinate margins glabrous on both sides 10. *P. baicalense* (Redow.) C. Koch.
+ Terminal leaf lobules (teeth) oblong-triangular, 2–5 mm wide,
often nerves scabrous-hairy above . . . 11. *P. terebinthaceum* Fisch.
22. Entire plant densely short-scabrous-hairy; stem 20–50 cm high
. 31. *P. palimbioides* Boiss.
+ Plant glabrous 23.
23. Petals white 24.
+ Petals yellowish or greenish-yellowish 26.
24. Leaves simple-pinnate, lobules 1–3 cm long, 1–3 mm wide
. 14. *P. falcaria* Turcz.
+ Leaves bi- or tripinnate 25.
171 25. Plant 10–50 cm high; lobes of the last order 1 cm long, 0.5 mm wide
(Siberia) 16. *P. vaginatum* Ldb.
+ Plant 50–70 cm high; lobules 1–2.5 cm long, 1–1.5 m wide
. 28. *P. schottii* Bess.
26. Umbels of 12–20 rays; upper cauline leaves sessile on inflated
sheath; fruit ovoid, 8–10 mm long, 4–5 mm wide (Centr. Asia)
. 38. *P. transiliense* Herd.
+ Umbels of 5–15 rays; involucels of 3–12 leaflets 27.
27. Leaves oblong, 7–10 cm long, 3–5 cm wide; lobules linear
(Caucasus) 34. *P. paucifolium* Ldb.
+ Leaves triangular, 10–16 cm long, 8–10 cm wide; lobules oblong-
oval (Centr. Asia) 39. *P. polyanthum* Korov.

28. Umbel of 3-8 rays (Transcaucasia) 29.
+ Umbel of more than 10 rays 30.
29. Umbel of 3-5 rays 36. *P. pauciradiatum* Tamamsch.
+ Umbel of 5-8 rays 35. *P. adae* Woron.
30. Petals yellow or greenish-yellowish 31.
+ Petals white 33.
31. Petals yellow; terminal leaf lobes cut into oblong or lanceolate,
short-acuminate lobules, 3-10 mm long, 1.5-3 mm wide; fruit
ovoid, marginal wings equal to half diameter of fruit
. 33. *P. lubimenkoanum* Kot.
+ Petals greenish-yellowish; lobes of the last order broadly ovate,
2.5-4 cm long, 1.5-3.5 cm wide, largely and unequally toothed,
sometimes deeply unequally cut; umbels of 5-18 rays; fruit ellip-
soid, marginal wings narrow (Talysh and Turkmenia) 32.
32. Fruit thinly scabrous, dorsal ribs winged (Talysh)
. 23. *P. cervariifolium* C. A. M.
+ Fruit smooth, dorsal ribs filiform (Turkmenia)
. 24. *P. sintenisii* Wolff.
33. Stem hollow, easily crumbling when dry; commissural canals hidden
in pericarp. Swamp plants 37. *P. palustre* (L.) Moench.
+ Stem not as above; commissure canals superficial 34.
34. Lobules of the last order resembling leaflets, broad, 1-10 cm long,
0.5-1.5 cm wide 35.
172 + Lobules of the last order linear, 4-20 mm long, ca. 1 mm wide . . . 38.
35. Leaves simple- or bipinnate, with large ovate-oblong or lanceolate leaflets,
with large unequal teeth or crenate-serrate, 4-10 cm long, 3-8 cm
wide (S. European part and N. Caucasus) 36.
+ Leaves tripinnate, lobules of the last order 1-3.5 cm long,
0.5-1.5 cm wide 37.
36. Leaves thin, not coriaceous, scabrous along nerves above, teeth
large, unequal; leaflets of involucre filiform (Caucasus)
. 25. *P. latifolium* (M. B.) DC.
+ Leaves nearly conical, glabrous along nerves above, leaflets
evenly crenate-serrate; leaflets of involucre lanceolate (S. Euro-
pean part) 26. *P. macrophyllum* Schischk.
37. Leaf blade geniculately recurved, lobes of the last order deeply
segmented, segments widest at middle or higher, thin, nearly same
color on both sides, incised-dentate, nearly entire at base; teeth
with short obtuse cusp; fruit subglobular; commissural canals 2,
close to margin, much curved 21. *P. oreoselinum* L.
+ Leaf blade erect; lobes of the last order ovate, widest below middle,
thickish, paler beneath, dentate, teeth with forward directed cusp;
fruit oblong-ellipsoid, commissural canals 2, close to median line. .
. 22. *P. cervaria* (L.) Guss.
38. Stems many, 10-30 cm high, simple, its base covered with numerous,
persistent, hardened petioles of dead leaves, short-scabrous-
hairy in lower part; with 1 umbel 18. *P. hystrix* Bge.
+ Stems usually single, 30-100 cm high, branching above, with few
or many umbels; base without petioles of dead leaves 39.

39. Stems scabrous below inflorescence; terminal lobules with whitish prickly mucro, to 1–1.5 mm long (Far East) 13. *P. elegans* Kom.
 + Stems subglabrous below inflorescence; terminal lobules without long mucro 40.
 40. Terminal lobules lanceolate-linear, 2–10 mm long, ca. 1 mm wide, with downward rolled margins, glabrous on both sides 10. *P. baicalense* (Redow.) Koch.
 + Terminal leaf lobules (teeth) oblong-triangular, 2–5 mm wide, often scabrous-hairy along nerves above 11. *P. terebinthaceum* Fisch.

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Section 1. EUPEUCEDANUM Duby, Synops. pl. in flora Gall. (1828) 221; DC. Prodr. IV (1830) 176, ex parte. — Section *Peucedanopsis* Rouy et Camus, Flore de France, VII (1901) 388. — Calyx-teeth distinct, petals ovate-rounded, slightly notched, lateral wings broad, canals solitary in valliculae. Leaves twice or many times ternately dissected; lobes of the first order petioled, of the last order linear, entire, long-acuminate, involucre of few leaves.

1. *P. ruthenicum* M. B. Fl. taur.-cauc. I (1808) 215; Ldb. Fl. Ross. II, 309; Shmal'g., Fl. I, 409; Grossg., Fl. Kavk. III, 183. — *P. Bessarianum* DC. Prodr. IV (1830) 177. — *P. officinale* Ldb. Fl. Ross. II, 308, ex parte, non L.; Grossg., Fl. Kavk. III, 183. — *P. ledebourii* G. Don, Gener. syst. of gard. and bot. III (1834) 330. — *Ferula ruthenica* Spreng. Umbell. Prodr. (1813) 14. — *F. besseriana* Spreng. ex Bess. ap. Schult. Syst. veget. VI (1820) 567 in obs. — Ic.: Fl. Yugo-Vost. V, Figure 541. — Exs.: G. R. F. No. 1725.

Perennial; root rather thick; stem 50–80 cm high, thinly furrowed, slightly branching in upper part; radical and lower cauline leaves with long petioles, three, rarely four times, ternately dissected, their blade broadly triangular, 8–15 cm long, 10–20 cm wide; lobules linear, 2–7 cm long, 1–3 mm wide, rarely lanceolate, 6–7 mm wide (var. *cretaceum* Schischk.), stiff, gradually acuminate, median leaves smaller, less dissected, the upper reduced to oblong sheath, nearly without blade. Terminal umbels 4–8 cm across, of 14–21 unequal, glabrous rays; lateral umbels smaller; involucre absent or of 1–5 linear-subulate, caducous leaflets; umbellets 5–9 mm across; involucels of 5–7 linear-subulate leaflets, shorter than rays; calyx-teeth short, subulate; petals pale yellow, not emarginate, ca. 1.5 mm long; fruit ellipsoid, 6–7.5 mm long, 3–4 mm wide, nearly as long as pedicels, dorsal ribs slightly protruding, the marginal 0.6 mm wide. July–August.

Steppes and forest-steppes, sandy and calcareous slopes. — European part: M. Dnp., V.-Don, L. Don, Bes., U. Dns., Bl., Transv., L. V. (N.); Caucasus: Cisc., E. Transc. Gen. distr.: Bal. (N.). Described from S. Russia. Type in Leningrad.

Note 1. A form with wide lobes (to 6–7 mm) mainly in the radical leaves, grows in the chalky hills of the former Bobrov county. Lack of herbarium material prevents us from separating it as a distinct species.

In the herbarium of the V. L. Komarov Botanical Institute of the Academy of Sciences of the USSR there are specimens from Pchelinovka in Bobrov 174 county (T. I. Popov) and from the chalky slope of "Kamenistaya Steppe" on the Talovaya River (G. Tanfil'ev). We would like to draw attention to this form from chalky outcrops.

Note 2. Unlabeled specimens collected by Ruprecht in the Caucasus are distinguished by larger fruits. Boissier, who saw them, determined them to be *P. ruthenicum* with the comment "fructibus majoribus," also noting the absence of labels.

2. *P. tauricum* M. B. Fl. taur. cauc. I (1808) 215; Grossg., Fl. Kavk. III, 183. — *P. ruthenicum* β . *tauricum* DC. Prodr. IV (1830) 177; Ldb. Fl. Ross. II, 309; Boiss. Fl. or. II, 1017. — Exs.: Herb. Fl. cauc. No. 440.

Perennial; root thick, 0.7–1.5 cm thick, its neck densely covered with brown fibrous remnants of petioles; stem 40–80 cm high, erect, furrowed, few-leaved, slightly branching in upper part; radical and lower cauline leaves with long petioles, many times ternately dissected, broadly triangular, 6–8 cm long, 8–10 cm wide; terminal lobes linear, stiff, gradually acuminate, glabrous, 1-nerved, 1.5–4 cm long, 1–2 mm wide, median leaves smaller, less dissected, their short petioles expanding to sheath, uppermost leaves reduced to 1 sheath. Umbels 3–8 cm across, of 17–21 smooth unequal rays; involucre of 3 linear-subulate, caducous leaflets shifted to one side; umbellets 8–10 mm across; involucels of 5–6 linear-filiform, thin-acuminate leaflets, shorter than rays; calyx-teeth very short; petals pale yellow, broadly ovate, not emarginate, ca. 1.5 mm long; fruit ellipsoid, 4–5 mm long, 2.5 mm wide, nearly as long as stalks, dorsal ribs filiform, the marginal ca. 0.5 mm wide. Fl. July–August, Fr. September.

Stony and herbaceous slopes, pine forests. — European part: Crim.; Caucasus; W. Transc. (Novorossiisk), Cisc. Endemic. Described from the Crimea. Type in Leningrad.

Note. Differs from *P. ruthenicum* by the shorter stem, 40–80 cm long (not 80–120 cm), shorter lobules, 1.5–4 cm long (not 2–9 cm) and smaller fruits, ca. 4 mm long (not 6–7 mm).

3. *P. calcareum* Alb. in Tr. Tifl. Bot. Sada, I (1895) 114; Grossg., Fl. Kavk. III, 182; Maleev in Tr. Tifl. Bot. inst. I (1934) 119. — *Seseli calcareum* Alb. l. c. (1895) 108. — Exs.: Pl. or. exs. No. 392.

Perennial; entire plant glabrous; root thick, its neck covered with dark brown fibrous remnants of dead petioles; stems few, 40–80 cm, erect or 175 ascending at base, thinly furrowed, usually violet in lower part, slightly branching above; radical leaves with petioles usually longer than blade, broadly triangular, many times ternately dissected; terminal lobes narrowly linear, 1–7 cm long, 0.3–0.5 mm wide, median leaves smaller, less dissected, the upper reduced to bladeless, oblong-linear sheath, or with rudimentary tripartite blade. Umbels 3–10 cm across, of 15–23 smooth, unequal rays; involucre of 3–8 linear-subulate, caducous, thin-acuminate leaflets; umbellets 5–8 mm across; involucels of 5–7 linear subulate leaflets nearly as long as rays; calyx-teeth very short, acute, persistent in fruit; petals greenish-yellowish, broadly ovate, obscurely notched, with inward curved

tip, ca. 1.5 mm long; fruit ovoid, 6–7 mm long, 3–4 mm wide, on pedicels half as long, dorsal ribs filiform, the marginal with ca. 0.6 mm wide wings and 4, rarely 2 canals toward commissure. Fl. August–September, Fr. September–October.

Calcareous cliffs and stony slopes, to 2,000 m. — Caucasus: Cisc. (W.), W. Transc. (Sochi, Abkhazia). Described from Mamdzyshk, Kopeimys and Psyrtskh mountains. Type in Geneva, cotype in Leningrad.

Note. Distinguished from allied species by the short fruiting pedicels, ovoid fruits, and filiform-linear leaf lobes.

4. *P. morisonii* Bess. in Schult. Syst. veg. VI (1820) 567, in obs.; DC. Prodr. IV, 177. — *P. ruthenicum* Kryl. Fl. Zap. Sib. VIII (1935) 2045, non M. B. — *Ligusticum longifolium* Willd. Sp. pl. I (1798) 1428, non *Peucedanum longifolium* Waldst. et Kit.

Perennial; stem 60–120 cm high, cylindrical, finely furrowed, few-leaved, branching in upper part; radical and lower cauline leaves long-petioled, many times ternately dissected, their blade broadly triangular, 15–30 cm long and as wide; terminal lobules linear, stiff, gradually acuminate, glabrous, 1-nerved, 2–9 cm long, 1–4 cm wide; median leaves smaller, less dissected, with short amplexicaul petioles, uppermost leaves reduced to sheath, bladeless. Umbels terminal, 8–17 cm across, of 29–35 unequal glabrous rays; involucre of few, usually 3, caducous leaflets; umbellets 10–15 mm across; involucels of 5–13 linear-filiform leaflets shorter than rays; calyx-teeth short, subulate; petals pale yellow, broadly ovate, not notched, ca. 1.5 mm long; fruit ellipsoid, 8–9 mm long, 4–5 mm wide, as long as or shorter than pedicel, dorsal ribs slightly protruding, acute, the marginal 0.75 mm wide; canals solitary in vallecule, 2 toward commissure. July–August.

Meadow steppes and slopes. — W. Siberia: U. Tov., Ob. Irt., Alt.; Centr. Asia: Ar.-Casp. (N.), Balkh., Dzu-Tarb. (Tarbag). Endemic. Described from Siberia. Type in Geneva.

4a. *P. luxurians* Tamamsch. sp. nova in Addenda XVI, 353.

Perennial; root thick, its neck covered with dry, fibrous remnants of previous year's leaves; stems few, to 1.5 m high, cylindrical, slightly furrowed; leaves with long petioles, triangular, trisected into narrow, 7–8 mm long, 1 mm wide, nearly subulate lobules with 3 protruding nerves beneath; petioles expanding to sheath; median cauline leaves like the lower, terminal leaves obsolete. Umbels of 20–40 unequal rays; involucre multifoliate, of unequal, linear-setaceous, reflexed leaflets; umbellets of 20–30 rays; involucels of many setaceous, reflexed leaflets shorter than rays; calyx-teeth distinct, triangular, petals greenish at first, becoming yellow, with acuminate inward curved tip; styles short, erect; ripe fruit unknown.

Subalpine and alpine meadows and wooded slopes. — Caucasus: S. Transc. (Karabakh). Endemic. Described from gorge of Terter River. Type in Moscow.

5. *P. songoricum* Schischk. sp. nova in Addenda XVI, 354.

Perennial; entire plant glabrous; root thick, 2–3 cm across, its neck covered with dark brown remnants of petioles; stem 60–70 cm high, thinly

furrowed, simple or slightly branching in upper part; radical leaves long-petioled, three or nearly four times ternately dissected, their blade triangular, 12–15 cm long, 10–12 cm wide; terminal lobes linear, 1–4 cm long, ca. 1 mm wide, stiff, acuminate; lower cauline leaves smaller, less dissected, the upper with obsolete sessile blade on oblong sheath. Umbels 5–6 cm across, of 11–15 unequal glabrous rays, lateral umbels smaller; involucre lacking or of 1–2 caducous leaflets; umbellets 6–10 mm across; involucels of 5–7 linear-subulate leaflets shorter than rays; calyx-teeth triangular, distinct; petals greenish or pale yellow, hardly notched, ca. 1.5 mm long; ripe fruit unknown; stylopodium conical; styles erect or divergent, shorter than stylopodium. July.

- 177 Steppe slopes. — Centr. Asia: Dzu-Tarb. (Dzungarian Ala-Tau).
Endemic. Described from Bayan-Dzhuryuk Mountains. Type in Leningrad.

Section 2. *JUNCEA* Boiss. Fl. or. II (1872) 1014. — Leaf lobules cylindrical, rounded or filiform, similar to petioles; mericarps with narrow margins; 1 canal per vallecule.

6. *P. renardii* Rgl. et Schmalh. in Tr. Bot. Sada, V, 2 (1878) 596. — *P. talassicum* Korov. in Bot. mat. Inst. Bot. i Zool. AN UzSSR, VIII (1947) 7.

Perennial; entire plant glabrous, glaucescent-green; root 1–4 cm thick; stems few, 30–60 cm high, branching, their base covered with fibrous brown remnants of leaves; lower leaves with petioles expanding to sheath, tri-pinnate; primary lobes petioluled, bipinnatisect, lobules semi-cylindrical, narrowly linear-lanceolate, mucronate, 1–4 cm long, 1–2 mm wide; upper leaves smaller, with blade on inflated sheath. Umbels of 6–12 unequal glabrous rays; flowers polygamous; involucre and involucels lacking; umbellets of 15–20 rays; calyx-teeth distinct, triangular-lanceolate; petals yellow, with inward curved tip, 0.8 mm long; fruit ovate, plano-compressed, 6–7 mm long, 4–4.5 mm wide; dorsal ribs filiform, distinctly protruding at apex of fruit; lateral wings very narrow, obscure; stylopodium flattened-conical, with thickened undulant base; styles as long as stylopodium; canals 1 per vallecule, 2 toward commissure. July. (Plate VIII, Figure 12.)

Stony southern slopes, to 3,500 m. — Centr. Asia: T. Sh. (W.). Endemic. Described from Karabur pass in Talass Ala-Tau. Type in Leningrad.

7. *P. turcomanicum* Schischk. in Fl. Turkm. V (1950) 230. — *P. involucratum* Korov. in Bot. mat. gerb. Glavn. Bot. Sada RSFSR, V (1924) 84, non *P. involucratum* Koch (1824).

Perennial; entire plant glabrous, glaucescent; root 1–1.5 cm thick, its neck densely covered with brown fibrous remnants of petioles; stems few, 100–120 cm high, erect, cylindrical, thinly furrowed, branching, leafy below, only with sheaths above; radical leaves short-petioled, triangular, twice or thrice ternately dissected; lobes of the last order rounded, 15–25 cm long, 0.8–2 mm thick, acute; lower cauline leaves similar to radical but with longer petioles expanding to narrow lanceolate sheath; upper leaves reduced to oblong, gradually attenuate sheaths with rudimentary blade. Umbels 5–10 cm across, of 9–19 glabrous, very unequal rays; lateral

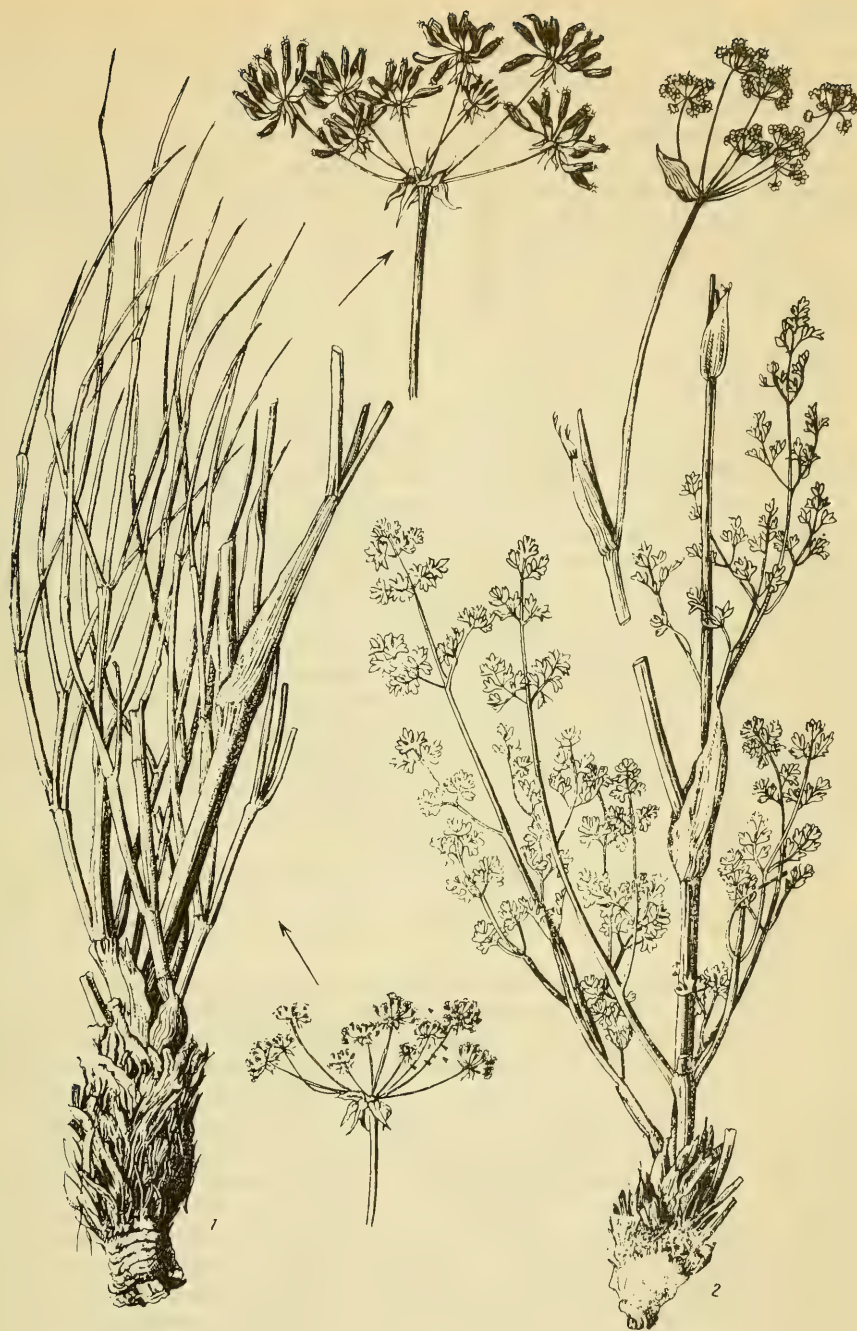


PLATE XVIII. 1—*Peucedanum turcomanicum* Schischk.; 2—*P. transiliense* Herd.

178 umbels smaller; involucre of 1-3 unequal, lanceolate, herbaceous, acute leaflets; umbellets 12-20-flowered, 5-8 mm across; involucels of 4-7 lanceolate acuminate leaflets nearly as long or half as long as pedicels; calyx-teeth triangular; petals yellowish-greenish, broadly ovate, obtuse or acute, with inward curved tip; unripe fruit on pedicels as long as fruit, oblong-ellipsoid, 5-6 mm long, 2.5-3 mm wide, with 3 thin dorsal and narrowly winged lateral ribs; canals solitary in valliculae, 2 toward commissure. June-July. (Plate XVIII, Figure 1.)

Cliffs to 2,000 m. - Centr. Asia: Mtn. Turkm. (Greater Balkhan Range, Kopet Dag). Endemic. Described from Greater Balkhan Range. Type in Tashkent.

8. *P. hissaricum* Korov. in Bot. mat. Inst. Bot. i Zool. AN UzSSR, VIII (1947) 8.

Perennial; glaucescent, dark green, completely glabrous plant, its neck woody, short-haired, covered with numerous persistent petioles; in older plants stems few, 50-80 cm high, erect, cylindrical, thinly furrowed, with 1-3 branches in upper half; radical leaves antrorse, with short firm cylindrical petioles, their blade quadripinnatisect into narrow linear, flat, acute, 1.5-6 cm long, 0.5-0.8 mm wide, erect lobules; lower cauline leaves similar to radical but smaller, the upper with reduced blade sessile on lanceolate amplexicaul sheath. Umbels without involucre, of 20-30 nearly equal, 4-4.5 cm long, glabrous, furrowed rays; umbellets 20-25-flowered, with involucels of 4-5 linear, herbaceous, acuminate, 2 mm long leaflets; flowers on long stalks; calyx-teeth small, deciduous; stylopodium flattened-conical, with lobed margin; styles shorter than stylopodium, reflexed; fruit ovoid, 5 mm long, 2.5 mm wide; mericarps with 3 filiform dorsal and 2 narrowly winged, tightly adjacent ribs; canals in valliculae solitary, broad, taking up entire interval between ribs. June-July.

Stony slopes and cliffs. - Centr. Asia: Pam.-Al. Endemic. Described from Gissar Range, Sardan-i-Mion River. Type in Tashkent.

9. *P. mogoltavicum* Korov. in Bot. mat. Inst. Bot. i Zool. AN UzSSR, VIII (1947) 9.

181 Perennial; glaucescent, completely glabrous plant; root thick, its neck reduced, not branching, covered with numerous persistent dead petioles; stem more than 1 m high, cylindrical, rounded, thinly furrowed, brownish, glaucous, leafless, bifurcate in upper part; leaves in dense rosette, on stem reduced to lanceolate amplexicaul sheath; radical leaves on sturdy, cylindrical, short-haired petioles, with broadly rhombic blade, five times ternately dissected into flat, linear, acute, fleshy, to 5 cm long, 2 mm wide sections; rhachises of all leaf sections sturdy, cylindrical, cauline leaves reduced to sheath. Umbels of 3-7 glabrous, 5-6 cm long, furrowed, spreading rays; umbellets many-flowered, capitate, involucels of 10-12 linear, acute leaflets as long as pedicels; pedicels thin, 2 mm long; calyx-teeth small, deciduous; petals yellow, nearly rounded, with short acute inward curved tip, 1 mm long; stylopodium flattened-conical, with broadened lobes, becoming elevated; styles filiform, reflexed, 1 mm long; fruit flat, longer than very short thin pedicels, 5 mm long; ribs thin, hardly protruding lateral ribs pass along margin of fruit; resinous canals narrow, solitary between ribs, 2 toward commissure. July.

Granite cliffs. — Centr. Asia: Pam.-Al. Endemic. Described from Mongol-Tau Mountains. Type in Tashkent.

Section 3. SELINOIDES DC. Prodr. IV (1830) 150. — Calyx-teeth very distinct; petals white; fruit broadly ellipsoid; marginal ribs broad, sometimes nearly transparent; canals solitary in vallecule, 2–4 toward commissure. Involucre of few caducous leaflets, rarely persistent.

10. *P. baicalense* (Redow.) C. Koch in Nov. Act. Nat. cur. XII, 1 (1824) 94; DC. Prodr. IV, 179; Ldb. Fl. Ross. II, 313; Turcz. Fl. baic.-dahur. I, 501; Kryl., Fl. Zap. Sib. VIII, 2048. — *P. polyphyllum* Ldb. Fl. alt. I (1829) 314. — *Selinum baicalense* Redowsky in Willd. Enum. Hort. berol. I (1809) 306. — *S. obscurum* Fisch. ex Trevir. Ind. sem. Horti Wratisl. App. III (1821) 3. — *Pteroselinum sibiricum* Rchb. Fl. germ. excurs. (1832) 454. — Exs.: G. R. F. No. 2625.

Perennial; stem 30–100 cm high, ribbed, usually strongly branching, like leaves glabrous; leaves bipinnate, stiffish, grayish green; radical leaves many, their blade oblong or oblong-elliptic, 3–10 cm long, 2–5 cm wide; leaflets sessile, secondary pinnatisect or trisect into lanceolate-linear lobules, 2–10 mm long, ca. 1 mm wide, with obscurely revolute margins; 182 upper leaves smaller, less dissected, their sheath appressed to stem. Umbels in nearly corymbiform inflorescence, 3–10 cm across, abundant at ends of stem and branches, of 10–25 short-haired rays; involucre of 3–8 lanceolate or linear, acuminate, short-haired, caducous leaflets; umbellets 7–15 mm across; involucels of many lanceolate, acuminate leaflets with scarious margin, nearly as long as pedicels; calyx-teeth very short, acute; petals white, obcordate, 1.5 mm long; fruit broadly ellipsoid, 4–5 mm long, 3.5–4 mm wide; canals flattened, solitary in vallecule. June–August.

Stony, pebbly, sometimes sandy slopes, sandy soil in pine forests. — W. Siberia: Ob, Irt., Alt.; E. Siberia: Ang.-Say., Dau., Lena-Kol. Gen. distr.: Mong. Described from Baikal. Type was in Berlin.

11. *P. terebinthaceum* Fisch. in DC. Prodr. IV (1830) 179; Rchb. Fl. Germ. excurs. (1832) 454, pro synonym; Ldb. Fl. Ross. II, 314; Turcz. Fl. baic.-dah. I, 502. — *P. dahuricum* Turcz. ex Steud. Nomencl. ed. 2, II (1841) 311, nom. — *P. paischanense* Nakai in Tokyo Bot. Mag. XXXI (1917) 101. — *Selinum terebinthaceum* Fisch. ex Trevir. Ind. sem. Horti Wratisl. App. III (1821) 3; Trevir. in Nov. Act. nat. cur. XIII (1823) 166. — *Oreoselinum dahuricum* Bess. ex Steud. Nomencl. ed. 2, II (1841) 311. — *Imperatoria dahurica* D. Dietr. Synops. pl. II (1839–1852) 969. — Exs.: G. R. F. No. 2629.

Perennial; root erect, rather thick, 5–7 mm across, its neck covered with brownish-black remnants of petioles; stem 40–80 cm high, cylindrical, longitudinally striated, more or less branching above (sometimes nearly from base), scabrous below inflorescence; radical leaves with long petioles, their blade bipinnate, broadly oval, 6–8 cm long, 5–7 cm wide, terminal lobes oval or lanceolate, cuneate at base, 3–4 cm long, 1–2 cm wide, acutely toothed or pinnatifid, glabrous. Umbels 7–15 cm across, of

- 10–35 rays acutely scabrous above; involucre absent or of 1–2 or many linear-lanceolate, caducous leaflets; umbellets 10 mm across; involucels of 5–9 linear, thinly acuminate leaflets; calyx with rather long acute teeth; petals white or pink, subrounded, ca. 1.5 mm long and as wide, with yellowish midrib, deeply notched, with inward curved tip; fruit oval-rounded, dorsally compressed, 3–4 mm long, 2.5–3 mm wide, dorsal ribs filiform, the marginal with winglike broadening, 0.4 mm wide; stylopodium conical; styles reflexed, longer than stylopodium. Fl. July–August, Fr. September.
- 183 Meadows, shrubs, pine and broadleaved forests, stony slopes. — E. Siberia: Dau., Lena-Kol.; Far East: Ze.-Bu., Uss. Gen. distr.: Ch.-Jap. Described from Transbaikalia. Type in Geneva.

12. *P. eryngiifolium* Kom. in Izv. Bot. sada AN SSSR, XXX (1932) 207. — Ic.: Kom. 1. c. Figure 1, page 207.

Perennial; root rather thick, fusiform; stem 10–25 cm high, deeply furrowed, glabrous, branching from base, rarely nearly simple; radical and lower cauline leaves triangular or ovate, their petioles gradually expanding to sheath, shorter or longer than blade; blade 4–8 cm long, 4–7 cm wide, bi- or tripinnatisect, lobes of the first order broadly ovate, 1.5–3.5 cm long, 1.2–3 cm wide, petioluled, lobes of the second order more or less deeply cut into ovate, dentate lobules, with 2–4 mm long mucro. Umbels 6–9 cm across, of 20–30 nearly equal rays acutely scabrous above; involucre of 11–13 narrowly lanceolate or linear, sometimes pinnatifid, ultimately recurved, deciduous leaflets; umbellets many-flowered, 1 cm across, their rays scabrous, above involucels of 7–9 narrowly linear, long-acuminate, recurved leaflets with narrow scarious margin nearly as long as umbellet; calyx-teeth inconspicuous; petals white or faintly pink, broadly obcordate, notched, with inward curved lobules ca. 1 mm long; fruit broadly ovoid, 4 mm long, 3 mm wide; stylopodium short-conical; styles recurved, slightly longer than stylopodium; mericarps with 3 filiform dorsal and hardly expanding, slightly thickened marginal ribs. Fl. July, Fr. August.

Southern stony mountain slopes and taluses. — Far East: Uss. Endemic. Described from Snezhnaya Mountain (Sikhote-Alin). Type in Leningrad.

13. *P. elegans* Kom. in Tr. Bot. Sada, XVIII (1900) 430. — Ic.: Kom. ibid., XXII, Table XVI.

- Perennial; root fusiform, 3–8 mm thick; stem 70–80 cm high, erect, branching only above, longitudinally striated, scabrous below inflorescence; radical leaves long-petioled, tri- or quadripinnatisect, their blade 8–10 cm long, 6–8 cm wide, lobules lanceolate-linear, entire, 4–20 mm long, ca. 1 mm wide, with 1–1.5 mm long whitish subulate mucro. Umbels 4–7 cm across, of 15–23 rays scabrous above; involucre of 5–7 lanceolate-linear, acute or
- 184 thinly acuminate leaflets with scarious margin; umbellets 1–1.5 cm across; involucels of 7–9 linear-lanceolate leaflets nearly as long as pedicels; calyx-teeth triangular, acute, caducous; petals white or pink, abruptly tapering to short claw, subrounded, with inward curved tip; fruit ovoid, 4 mm long, ca. 3 mm wide, with three, protruding winglike dorsal and 0.5–1 mm wide lateral ribs; canals solitary in valliculae, 2 toward commissure. Fl. July–August, Fr. September.

Southern and stony slopes, forb grass meadows. — Far East: Uss. (basin of the Tyrma River). Endemic. Described from the basin of the Tyrma River. Type in Leningrad.

14. *P. falcaria* Turcz. in Bull. Soc. Nat. Mosc. V (1832) 192; Ikonnikov-Galitskii in Sistem. zam. gerb. Tomsk. univ. No. 5 (1935) 2; Kryl., Fl. Zap. Sib. VIII (1935) 2052. — *P. salsugineum* Kryl. in Tr. Bot. Sada, XXI, 1 (1903) 8; Kryl., Fl. Alt. IV (1903) 530. — *P. pricei* Simps. in Journ. Linn. Soc. XLI (1913) 419. — Ic.: Kryl. in Tr. Bot. Sada, 1. c. Table V, Figure 1; Simps. 1. c. tab. 23, f. 1–3. — Exs.: G. R. F. No. 3452.

Perennial; entire plant glabrous; root thick; stem 25–60 cm high, thinly furrowed, solitary, simple or branching; leaves glaucescent green, bipinnate, elliptic, 5–12 cm long, 3–5 cm wide, the lower long-petioled with sessile or very short-petioluled leaflets, deeply 3–5-partite into lanceolate-linear or linear, acute, 1–3 cm long, 1–3 mm wide lobules sometimes slightly broadening above; upper leaves smaller, less dissected, with 2–2.5 cm long petioles passing into amplexicaul sheaths with scarious margin. Umbels 3–6 cm across, of 7–12 unequal glabrous rays; involucre lacking or of 1–3 leaflets; umbellets ca. 10 mm across; involucels of 10–13 lanceolate-linear, nearly equal leaflets with membranous margins; calyx-teeth distinct, acute; petals white, rounded-ovate, emarginate, ca. 1.5 mm long; fruit nearly ovoid, 5.5–6 mm long, 4–4.5 mm wide; lateral wings ca. 1 mm wide; stylopodium dark violet; styles longer than stylopodium, reflexed; 3 canals per vallecule, 6 toward commissure. August.

Solonchaks. — W. Siberia: Alt. (Chuya steppe, Chiganchii, Aina-Bulak, Alekseevka); E. Siberia: Ang.-Say. (Tuva Region). Gen. distr.: N. Mongolia. Described from Mongolia. Type in Kiev.

15. *P. salinum* Pall. ex Spreng. Syst. veg. I (1825) 10; Ldb. Fl. Ross. II, 313; Kryl., Fl. Zap. Sib. VIII, 2051. — *P. album* Spreng. Gesch. d. Bot. II (1818) 200, non Desf. (1804) nec Poir. — *P. humile* Turcz. in Bull. Soc. Nat. Mosc. XI, 1 (1838) 93, nom. nud.; Fl. baic.-dah. I (1842–1845) 504. — *Athamanta tenuifolia* Pall. ex Schult. Syst. Veg. VI (1820) 495, non *Peucedanum tenuifolium* Thunb. (1800) nec Desf. (1804). — *Libanotis tenuifolia* DC. Prodr. IV (1830) 151. — *Oreoselinum humile* Bess. ex Steud. Nomencl. ed. 2, II (1841) 311. — Exs.: G. R. F. No. 2628, 3453.

Perennial; stem 20–40 cm high, glabrous, ribbed, simple or branching above, often purple-violet in upper part; lower leaves glabrous, long-petioled, bi- or tripinnate, with geniculately curved blade, lobes not in one plane; lobules of the last order linear or subfiliform, 1–4 cm long, 0.5–1 mm wide; upper leaves smaller, less dissected, with long (3–4 cm long), slightly inflated, membranous-margined, usually purple-violet divergent sheath. Umbels 3–8 cm across, of 5–12 slightly short-haired rays; involucre lacking or of 1–2, rather large, ovate or lanceolate colored leaflets; umbellets 10–20 mm across; involucels multifoliate, of linear, acuminate, usually colored leaflets as long as pedicels or shorter; calyx-teeth triangular; petals white or with violet tinge, subrounded, ca. 1.5 mm long; fruit ellipsoid, often violet above; canals solitary in valleculae. July–August.

Herbaceous or peaty bogs, meadow swamps, rarely wet solonchaks. — Arctic: Arc. Sib. (Tolsty Nos, Dudino); W. Siberia: Ob, Alt.; E. Siberia: ubiquitous. Gen. distr.: Mong. Described from Siberia. Type in London.

16. *P. vaginatum* Ldb. Fl. alt. I (1829) 312; Fl. Ross. II, 312; Kryl., Fl. Zap. Sib. VIII, 1935. — *P. vaginatum* α . *glabrum* Turcz. Fl. baic.-dahur. I (1842–1845) 503.

Perennial; entire plant glabrous; stem 10–30 cm, rarely 3–10 cm high, erect, single, rarely 2–3, slightly furrowed, usually not branching, nearly leafless (var. *pumilum* Ldb.); leaves bipinnate, oblong-elliptic, 6–12 cm long, 1.5–4 cm wide, leaflets pinnatisect into linear lobules 3–10 mm long, ca. 0.5 mm wide; radical leaves caducous, petioled; cauline leaves sessile, with 2–4 mm long, amplexicaul sheaths with white-membranous margins. Umbels 2–6 cm across, of 5–15 rays, glabrous or slightly scabrous above; general involucre lacking; umbellets ca. 10 mm across; involucels of few linear leaflets nearly as long as pedicels; calyx-teeth very short; petals white, very rarely violet, broadly ovate, emarginate, ca. 1.5 mm long; fruit globular-ellipsoid, 4 mm long, 3 mm wide; dorsal ribs filiform, the marginal 1 mm wide; stylopodium and styles dark violet; 2, sometimes 3 canals per vallecule. June–July.

186 Meadow steppes, exposed, often stony slopes, solonchic meadows. — W. Siberia: Ob, Alt.; E. Siberia: Ang-Say., Dau.; Far East: Ze.-Bu. Gen. distr.: Mong. Described from the Irtysh River in the Altai area and Koksuy River. Type in Leningrad.

17. *P. puberulum* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 93, nom. nud. — *P. vaginatum* β . *puberulum* Turcz. Fl. baic.-dah. I (1842–1845) 504.

Perennial; root erect or ascending, ca. 3 mm thick, its neck covered with dark brown fibrous remnants of petioles; stem 30–40 cm high, erect, slightly furrowed, slightly curved at nodes, thinly and densely scabrous-hairy, slightly branching above; radical leaves 8–15 cm long, 2–5 cm wide, caducous, oblong with short petiole expanding to sheath, tripinnatifid into narrow linear obtuse terminal lobules 3–8 mm long, ca. 0.5 mm wide; cauline leaves similar to the radical, the upper smaller, short-scabrous-hairy. Umbels 4–6 cm across, of 14–25 nearly equal rays with scabrous hairs mainly above; involucre lacking or of 1–4 linear-subulate, scarious-margined, caducous leaflets much shorter than umbel rays; umbellets 8–10 mm across with glabrous or scabrous rays; involucels of 5–9 linear-subulate, thinly acuminate leaflets with scarious margin, nearly as long as pedicels; calyx-teeth very short; petals white, broadly ovate, emarginate; fruit broadly ovoid, 2.5 mm long, 2 mm wide, with 3 filiform dorsal and broadly winged lateral ribs. July.

Meadows, sometimes solonchic. — E. Siberia: Ang. Say. (Olkhon Island in Baikal), Dau., Lena-Kol. Endemic. Described from Transbaikalia. Type in Leningrad.

18. *P. hystrix* Bge. Suppl. Fl. alt. (1835) 16; Ldb. Fl. Ross. II, 312; Kryl., Fl. Zap. Sib. VII, 2052.

Perennial; root thick, woody, multicapital; stems 10–30 cm high, numerous, erect, very short-scabrous in lower part and under inflorescence, ribbed, simple, with 1–2 leaves at base, leafless above; covered below with hardened remnants of petioles; leaves bipinnate, short-scabrous (rarely subglabrous), oblong-lanceolate, with 4–5 pairs of primary leaflets; secondary leaflets trifid into linear, acute lobules; petioles expanding into sheath with broad membranous margins. Umbels 2–4 cm across, of 10–20 equal rays acutely
187 scabrous inside; involucre and involucels of 5–7 lanceolate or subulate, deciduous leaflets with broad membranous margin; calyx-teeth indistinct; petals white, ovate; fruit globose-ellipsoid, 4 mm long, 4 mm wide; 1–2 canals per vallecule; dorsal ribs protruding, the marginal ca. 1 mm wide. June–July. (Plate VIII, Figure 11.)

Stony slopes and taluses in the alpine belt. — W. Siberia: Alt. (Iktu Mountain, Tobozhok River, Kok-Sairy River); E. Siberia: (Munku-Sardyk Mountain). Gen. distr.: Mong. Described from Tobozhok River, a tributary of the Chuya River. Type in Leningrad.

Section 4. PSEUDOSELINUM C. Koch in Linnaea, XVI (1843) 356; Boiss. Fl. or. II (1872) 1015. — Calyx-teeth indistinct, marginal ribs slightly expanding, canals solitary in vallecule, 4 toward commissure. Involucre and involucels nearly absent.

19. *P. caucasicum* (M. B.) C. Koch in Linnaea, XVI (1843) 358; Ldb. Fl. Ross. II, 315; Boiss. Fl. or. II, 1025; Grossg., Fl. Kavk. III, 182. — *Selinum caucasicum* M. B. Fl. taur.-cauc. I (1808) 213. — *Imperatoria caucasica* Spreng. Umbell. Prodr. (1813) 17. — *Oreoselinum caucasicum* M. B. Fl. taur.-cauc. III (1819) 209. — *Levisticum caucasicum* Lipsky in Tr. Bot. Sada, XIV (1898) 271. — Exs.: Herb. Fl. cauc. No. 340; Pl. orient. exs. No. 42.

Perennial; root 1–1.5 cm thick, vertical, its neck covered with dark brown remnants of leaves; stem 40–120 cm high, branching; solid inside, like leaves glabrous, angled-furrowed; radical leaves long-petioled, ovate-triangular, ternate, with once or twice pinnatisect blades, primary lobes on petioles, lobules of the last order cuneate-rhombic, 3–5 cm long, 2–2.5 cm wide, with large acute teeth, shortly and acutely scabrous along margins and nerves above; upper leaves less dissected, with smaller lanceolate leaflets. Umbels of 6–16 rays scabrous above; involucre lacking; involucels of 2–3 setaceous leaflets usually longer than umbellets, rarely involucels lacking; petals whitish-yellowish; fruit ovoid, 5–6 mm long, 3 mm wide, with prominent dorsal and appressed marginal ribs; stylopodium conical, styles recurved, as long as stylopodium; canals solitary in vallecule, 4 toward commissure. Fl. July–August, Fr. September.

Along edges of thinned-out forests, shrubby formations. — Caucasus: Cisc. (W.), E., W. and S. Transc., Tal. Gen. distr.: As. Min. (Pontus Range). Described from Georgia. Type in Leningrad.

20. *P. zedelmeyerianum* Manden. in Izv. Akad. Nauk, Arm. SSR, No. 1 (1945) 71.

188 Perennial; stem 60–80 cm high, thick, cylindrical, deeply furrowed, glabrous, slightly branching in upper part; radical leaves long-petioled, their blade broadly ovate, of 2 pairs of entire, ovate-oblong, acutely toothed decurrent leaflets; cauline leaves few, the lower with large sheath and small pinnatisect blade, the upper reduced to sheath. Terminal umbel large, the lateral smaller; umbels of 10–12 markedly unequal, glabrous rays, slightly scabrous only in upper part, sheath and involucels without leaflets; calyx-teeth large, persistent in fruit; petals pale yellow, obovate, with acute inward curved tip; fruit oblong, 5–7 mm long; canals solitary in valliculae, 2–4 toward commissure. June.

Slopes. — Caucasus; S. Transc. Endemic. Described from Gilli Island. Type in Tbilisi.

Note. *P. zedelmeyerianum* Manden. is apparently very close to and may be identical with *P. caucasicum* (M. B.) Koch. As the cotype in the herbarium of the V. L. Komarov Botanical Institute comprises only one specimen badly damaged by fungus, we were unable to resolve this question.

Section 5. OREOSELINUM (Adans.) Rchb. Handb. d. Gewächsk. (1827) 449, part. — Gen. oreoselinum Adans. Fam. II (1763) 100, nec Hoffm. — Cervaria Gaertn. Fruct. (1788) 91. — Calyx-teeth distinct, petals obovate, notched, white or greenish-whitish, rarely purple-reddish; fruit with narrow sometimes with thick marginal wings. Lobules of the last order more or less broad, leaf-shaped, dentate or laciniate; involucre and involucels present.

21. *P. oreoselinum* (L.) Moench, Meth. (1794) 82; Ldb. Fl. Ross. II, 311; Shmal'g., Fl. I, 410; Grossg., Fl. Kavk. III, 181. — *P. oreoselinum* var. *genuinum* Rouy et Camus, Fl. d. Franc. VII (1901) 394; K.-Pol. in Spiske rast. russk. flory, VIII (1922) 116. — *Athamanta oreoselinum* L. Sp. pl. (1753) 244. — *A. divaricata* Gilib. Fl. lithuan. II (1782) 17. — *Selinum oreoselinum* Crantz, Class. Umbell. Emend. (1767) 61. — *oreoselinum nigrum* Delarbre, Fl. d'Auvergne, ed. 2 (1800) 428. — *O. legitimum* M. B. Fl. taur.-cauc. III (1819) 210. — *Cervaria oreoselinum* Caud. Fl. Helvet. II (1827) 324. — Ic.: Syreishch., III. Fl. Mosk. gub. II (1907) 416. — Exs.: G. R. F. No. 2627; Fl. polon. exs. No. 722.

189 Perennial; root fusiform, 6–10 cm thick, its neck covered with fibrous remnants of leaves; stem 30–100 cm high, cylindrical, erect, thinly sulcate, glabrous or soft-hairy in lower part, slightly branching; radical leaves triangular, thickish, slightly shiny above, paler beneath, 30–40 cm long, 15 cm wide, bi- or tripinnatisect, primary and secondary lobes petioluled, geniculately curved below, lobes of the last order ovate, deeply pinnately lobate or pinnatisect, their lobules obovate, cuneate, 1–2 cm long, 0.5–1 cm wide, with slightly scabrous slightly inward rolled, serrate-dentate margin, teeth with short, obtuse, cartilaginous mucro; uppermost leaves less dissected, sessile on slightly inflated sheath. Umbels 10–15 cm across, of 11–25 thin, nearly equal (ca. 5 cm) rays, smooth or scabrous above, involucre of 9–13 lanceolate or linear-subulate, thinly acuminate, reflexed leaflets with scarious margin; umbellets 2.5 cm across; involucels of

7–9 linear-subulate leaflets nearly as long as umbellets; calyx-teeth ovate, distinct, obtuse; petals white or reddish, subrounded, ca. 1 mm long and as wide, tapering to short claw, notched, with inward curved tip; fruit broadly ellipsoid, subglobular, 5–8 mm long, 4–7 mm wide, usually half as long, rarely as long as pedicels; stylopodium short-conical; styles recurved, $1\frac{1}{2}$ times as long as stylopodium; dorsal ribs hardly protruding, the lateral winged, slightly swollen, 0.6–0.8 mm wide. July–August.

Oak and pine-oak forests, pine forests, forest edges, shrubs. — European part: Lad.-Ilm., Balt., U. Dnp., U. V., M. Dnp., V.-Don, V.-Kama (Tetyushi), Bl., L. Don, Bes., U. Dns.; Caucasus: Cisc. Gen. distr.: Scand., Centr. and S. Eur., Bal. Described from Germany, France and England. Type in London.

22. *P. cervaria* (L.) Cuss. in Lapeyer, Histoire abr. des Plant. Pyren. (1813) 149; Ldb. Fl. Ross. II, 311; Shmal'g., Fl. I, 410; Grossg., Fl. Kavk. III, 181. — *Selinum cervaria* L. Sp. pl. (1753) 1194. — *S. glaucum* Lam. Fl. Franc. III (1779) 419. — *Athamanta cervaria* L. Syst. ed. X (1759) 956. — *A. decussata* Gilib. Fl. lithuan. IV (1782) 18. — *A. latifolia* Viv. Fl. Ital. (1808) 22. — *Laserpitium paludapifolium* Mill. Gard. Dict. ed. VIII (1768) No. 3, p. p. — *Cervaria glauca* Gaud. Fl. Helvet. II (1828) 324. — *C. rivini* Gaertn. De Fruct. (1788) 91. — *C. rigida* Moench, Meth. (1794) 98. — *Ligusticum cervaria* Vill. Hist. Pl. Dauph. II (1787) 612. — Ic.: Syreishch., Illyustr. Fl. Mosk. gub. II (1907) 415. — Exs.: G. R. F. No. 1667.

190 Perennial; root 5–10 mm thick, its neck covered with dark brown, fibrous remnants of petioles; stem erect, cylindrical, shallowly furrowed in lower part, more deeply furrowed in upper part, nearly leafless; radical leaves nearly coriaceous, green above, paler beneath, ovate or oblong-triangular, bi- or tripinnate, ca. 50 cm long, to 30 cm wide, lobes of the last order sessile, ovate or oblong, 1.5–3.5 cm long, 0.5–1.5 cm wide, obtuse or short-acuminate, often cordate at base, outer or both sides of lower leaves often 1-lobed, with nearly spinous-crenate margin, its teeth with long whitish mucro; upper cauline leaves with reduced blade, on oblong sheath. Umbels large, 6–15 cm across, of 20–30 rays slightly scabrous above or subglabrous; involucre of 8–11 lanceolate-subulate recurved leaflets with whitish-scarious margin; umbellets ca. 1 cm across; involucels of 5–7 lanceolate-subulate recurved leaflets with scarious margin; calyx-teeth ovate, acute, distinctly discernible; petals elliptic or obovate, white, ca. 1.2 mm long, 1 mm wide, notched, with inward curved tip; fruit globular-ellipsoid or broadly ovoid, 4–6 mm long, 3–4.5 mm wide; dorsal ribs slightly protruding, filiform, the marginal 0.6–0.7 mm wide. July–August.

Shrubs, limestone slopes, felled areas. — European part: Balt., U. Dnp., M. Dnp., U. Dns., Bes., Bl. Gen. distr.: Centr. Eur., W. Med., Bal. Described from Switzerland and France. Type in London.

23. *P. cervariifolium* C. A. M. Verzeichn. Pfl. Kauk. (1831) 126; Ldb. Fl. Ross. II, 311; Boiss. Fl. or. II, 1025; Grossg., Fl. Kavk. III, 181.

Perennial; root thick, its neck covered with fibrous remnants of leaves; plant glaucous-green; stem 30–80 cm high, glabrous, cylindrical, nearly hollow, thinly furrowed, branching nearly from base; radical leaves with

- long petioles usually violet at base passing into short broadened sheath, their blade broadly triangular, 20 cm long, 30 cm wide, biternate, primary lobes long-, the secondary short-petioluled, broadly ovate, 4–5 cm long, 3–4 cm wide, largely and unequally toothed or incised, acutely scabrous along nerves above; upper leaves smaller, less dissected. Umbels of 5–14 unequal rays acutely scabrous above; involucre of 3–5 narrow linear scabrous leaflets thinly acuminate, scarious, with scabrous margin;
- 191 involucels of 5–7 narrow-linear, scabrous, long-acuminate leaflets with scarious margin, as long as umbellets; petals greenish or violet; fruit ellipsoid, finely scabrous, with 3 winged acute dorsal and winged marginal ribs; canals solitary in valliculae, 2 toward commissure. Fl. June–July, Fr. August.

Forests and shrubs, 900–1,800 m. — Caucasus: Tal. Gen. distr.: Iran (Gilan, Elburz). Described from Talysh. Type in Leningrad.

24. *P. sintenisii* Wolff in Fedde, Repert. spec. nov. XX (1924) 68. — *P. coloratum* Korov. in schedis. — Exs.: Sintenis, It. transcasp. - pers. No. 1056.

Perennial; root thick, its neck covered with fibrous remnants of leaves; stem 80–120 cm high, glabrous, thinly furrowed, hollow, violet, branching; radical leaves with petioles expanding to short sheath, their blade broadly triangular, 20–30 cm long, 15–20 cm wide, ternate, with primary, bi- or simple-pinnate lobes on more or less long petiolules, lobes of the last order broadly ovate, 2.5–4 cm long, 1.5–3.5 cm wide, with large unequal acute teeth, sometimes deeply and unequally incised, glabrous beneath, sometimes slightly scabrous along nerves above; upper leaves smaller, less dissected. Umbels 3–7 cm across, of 11–18 very unequal rays acutely scabrous above; involucre of 5–7 narrow linear leaflets with scarious margin, finely ciliate, several times shorter than umbellet rays; umbellets 5–7 mm across; involucels of 5–8 narrow, linear, smooth, acute or acuminate leaflets usually shorter than rays; petals greenish or greenish-yellowish; fruit ellipsoid, 4–5 mm long, 2–2.5 mm wide, glabrous, with filiform dorsal and narrowly winged lateral ribs. May–June, Fr. August.

Mountain slopes, sometimes subalpine slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Messinev Mountain in Kopet Dagh. Type in Berlin.

Note. Distinguished from *P. cervariifolium* C. A. M. by smooth fruits and filiform (not winged) dorsal ribs.

Section 6. *MACROSELINUM* (Schur) Schischk. comb. nov. — Gen. *Macroselinum* Schur in Verz. Siebenb. Ver. Naturw. IV (1853) 30; Enum. plantar. Transsylv. (1866) 266. — Calyx-teeth triangular; petals white, obovate; fruit ellipsoid or broadly ovoid, with 3 filiform dorsal and broadly winged marginal ribs; blade simple- or bipinnate or biternate, with large leaflets; involucre and involucels multifoliate.

25. *P. latifolium* (M. B.) DC. Prodr. IV (1830) 181, quoad pl. cauc.; Ldb. Fl. Ross. II, 315, ex parte; Boiss. Fl. or. II, 1023; Shmal'g., Fl. I, 410, pro minima parte; Grossg., Fl. Kavk. III, 181. — *Selinum*

192 *latifolium* M. B. Fl. taur.-cauc. I (1808) 213, quoad pl. cauc. — *Oreoselinum latifolium* M. B. Fl. taur.-cauc. III (1819) 211. — *Cervaria latifolia* Andrzej. ex Trautv. in Tr. Bot. Sada, VIII (1883) 395.

Perennial; stem 60–100 cm high, glabrous, cylindrical, thinly ribbed, usually violet below, erect; radical and lower cauline leaves petioled, not coriaceous, their blade biternate, ovate, acuminate lobes with large unequal teeth, 3–4 cm long, 1.5–2.5 cm wide, scabrous along nerves above. Umbellets of 15–27 unequal rays finely scabrous above; involucre of 3–5 nearly filiform, ultimately recurved leaflets; involucels of 4–5 narrow linear leaflets; petals white; fruit broadly ovoid or subglobose, 5–7 mm long, 3.5–5 mm wide, with filiform dorsal and broadly winged lateral ribs; stylopodium conical; styles recurved, nearly twice as long as stylopodium. July–August.

Light forests and shrubs, woods. — Caucasus: Cisc. Endemic. Described from Caucasian foothills. Type in Leningrad.

26. *P. macrophyllum* Schischk. nom. nov. — *Imperatoria laevigata* Boiss. in Ann. Sc. Nat. 3 sér. Bot. I (1844) 325, non *Peucedanum laevigatum* Nutt. (1840). — *Selinum latifolium* M. B. Fl. taur.-cauc. I (1808) 213, ex parte. — *Angelica laevigata* Fisch. Cat. Hort. Gorenk. (1812) 45, nom. nud. — *Peucedanum latifolium* Ldb. Fl. Ross. II, 315, part.; Shmal'g., Fl. I, 410, part.

Perennial; root 7–10 mm thick, erect, its neck covered with dark brown remnants of petioles; stem 40–100 cm high, erect, solitary, glabrous, furrowed, branching from middle or above; radical and lower cauline leaves with long petioles expanding to oblong sheath, their blade broadly ovate, 15–20 cm long, 10–13 cm wide, simple- or nearly bipinnate, lower primary lobes ternate, petioluled, the upper coriaceous, entire, broadly or narrowly ovate, acutely serrate-dentate, nerves not scabrous, 4–10 cm long, 1.5–8 cm wide; upper leaves smaller, simple-pinnate, sessile on expanded sheath. Umbels of 11–21 rays, lateral umbels smaller, rays unequal, glabrous or scabrous above; involucels of 4–6 lanceolate or linear-lanceolate, acute or acuminate, sometimes unequal, often recurved leaflets with scarious margin; involucels of 5–7 linear leaflets, shorter than umbellets; petals white; fruit ovoid, 5–6 mm long, 2.5–4 mm wide, dorsal ribs filiform, the marginal winged, 0.5–0.8 mm wide; stylopodium short-conical; styles reflexed, 2–3 times as long as stylopodium. July–August.

193 Steppe depressions, columnar solonchaks and solonchaks. — European part: M. Dnp., V.-Don, Bl., L. Don, L. V. Endemic. Described from Krasnoarmeisk. Type in Leningrad.

Note. In *Selinum latifolium* Bieberstein combined two species, one from the N. Caucasus, the other from the S. European part of the USSR. Since the Caucasus is the first locality indicated by him, his epithet is retained for the Caucasian plant.

Section 7. *IMPERATORIA* (L.) Koch Umbell. (1824) 95; Bluff. et Fing. Comp. Fl. germ. ed. 2 (1836). — Gen. *Imperatoria* L. Sp. pl. (1753) 371. — Subgen. *Imperatoria* Drude in E. u. P. Pflanzenfam. III, 8 (1898) 237. — Subgen. *Euimperatoria* Rouy et Camus, Fl. d. France, VII (1901) 395. — Calyx-teeth indistinct, petals white, abruptly tapering to claw,

broadly obovate, notched, with acute inward curved lobule; marginal wings broad; 1 canal per vallecule, 2 toward commissure; leaves biternate, with large leaflets.

27. *P. ostruthium* (L.) C. Koch, Umbell. (1824) 96; Ldb. Fl. Ross. II, 315. — *P. imperatoria* Endlich. Méd. Pfl. (1842) 395. — *Imperatoria ostruthium* L. Sp. pl. (1753) 371. — *I. trilobata* Gilib. Fl. lithuan. IV (1782) 34. — *Selinum imperatoria* Crantz, Stirp. Austr. III (1767) 42. — *S. ostruthium* Wallr. Annus Bot. (1815) 41. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 1964.

Perennial; plant with spicy odor reminiscent of celery or carrots; root thick, fusiform, producing numerous underground shoots; stem 30–100 cm high, erect, cylindrical, furrowed, glabrous, scabrous only below inflorescence, simple or branching above; leaves glabrous or scabrous beneath, especially along nerves, with short-ciliate margin; radical leaves 30 cm long, 35 cm wide, nearly biternate, i. e., lobes of the first order on petiolules tripartite nearly to base, lobules elliptic or lanceolate, acuminate, 5–10 cm long, 4–7 cm wide, unequally bidentate, teeth with mucro, terminal lobe cuneate, often shallowly trilobate, the lateral entire or bilobate; upper leaves simple-incised, sessile on inflated sheath. Umbels 10–15 cm across, of 40–50 rays finely scabrous above; involucre lacking or of 1 leaflet; umbellets ca. 1 cm across, their rays thin, subglabrous, much longer than fruit; involucels of few setaceous herbaceous leaflets; calyx-teeth indistinct; petals white or 194 reddish, 1–1.5 mm long, 0.75–1 mm wide, broadly obovate, notched, with inward curved tip, tapering to short claw; fruit globular, 4–5 mm long, nearly as wide, dorsal ribs protruding, the marginal broad, nearly as wide as part of fruit containing seeds; canals solitary in vallecule, 2 toward commissure. July–August.

European part: Balt. (?), U. Dnp. (Minsk?). Gen. distr.: Centr. Eur. (mountains of Centr. Eur. to W. Carpathians?), introduced in N. Am. Described from the Swiss and Austrian Alps. Type in London.

Note 1. Older authors (Gilib. l. c., Ldb. l. c.) believed this species to be endemic to the mountains of Central Europe, in Belorussia and Lithuania. Later investigators failed to confirm its occurrence in the western part of the USSR, and it should therefore be excluded from the Flora of the USSR, though may have been cultivated or grown in a semi-wild state. In the herbarium of the Botanical Institute there are no specimens from within the USSR.

Note 2. From Lithuania there has been described *Peucedanum subquadratum* Calest. (in Bull. della Soc. Bot. Ital. 1905, No. 6, 200) — *Imperatoria subquadrata* K.-Pol. (in Vestn. Russk. Fl. II, 2 (1916) 70). Close to *P. ostruthium*, with nearly quadrate habit, umbels of 12 rays; involucre and involucels lacking; fruit in profile square-obtrapezoid, notched at base, wider at summit, with broad marginal wings. This species requires further study; there are no specimens in the herbarium of the Botanical Institute.

Section 8. PALIMBIOIDEA Boiss. Fl. or. II (1872) 1014. — Sect. *Caroselinum* Calest. in Webbia, I (1905) 232. — Gen. *Caroselinum* Griseb.

Fl. Rumel. I (1843) 374, pro parte. — *Peucedanum* subgen. *Eucaroselinum* Rouy et Camus, Flore de France, VII (1901) 385. — Calyx-teeth inconspicuous; petals white or yellowish-greenish, rarely yellow; leaves simple- or bipinnate; lobes of the first order sessile or short-petioluled; involucre lacking; fruit ovoid or ellipsoid, with broad marginal wings; canals 1–3 per vallecula.

28. *P. schottii* Bess. ex DC. Prodr. IV (1830) 178; Ldb. Fl. Ross. II, 309. — *Petroselinum glaucum* Rchb. Fl. germ. excurs. (1832) 458.

195 Perennial; root fusiform; stem 50–70 cm high, erect, cylindrical, furrowed, branching above; radical leaves simple- or bipinnate, with more or less long petioles, lobes of the last order 1–2.5 cm long, 1–1.5 mm wide, entire; upper cauline leaves with shorter petioles, less dissected. Umbels 5–8 cm across, of 6–16 unequal, glabrous rays; involucre usually lacking; umbellets 0.7–1.2 cm across; involucre usually lacking or of 1–5 subulate, glabrous leaflets; calyx-teeth inconspicuous; petals white, broadly ovate, ca. 1 mm long, notched, with inward curved lobule; fruit globular-ellipsoid, 6–7.5 mm long, 4–5 mm wide, nearly as long as pedicels; dorsal ribs slightly protruding, the marginal winged; stylopodium short-conical, styles reflexed, much longer than stylopodium. July.

Slopes. — European part: U. Dns. (E. Podolia). Gen. distr.: Centr. Eur. (E.). Described from Podolia. Type in Leningrad.

29. *P. podolicum* (Bess.) Eichw. Skizze (1830) 155. — *Selinum podolicum* Bess. Prim. Fl. Galic. II (1809) 392; Hoffm. Umbell. ed. 2, (1816) 155. — *Peucedanum chabraei* Ldb. Fl. Ross. II, 308, ex parte, non Rchb. (1827); Shmal'g., Fl. I, 408. — *P. carvifolia* Grossh. Fl. Kavk. III (1932) 182, non Vill. — *P. euphymiae* Kotov in Bot. zhurn. Inst. bot. AN Ukr. SSR 1, 2 (1940) 178. — *Oreoselinum podolicum* M. B. Fl. taur-cauc. III (1819) 210, in nota; Bess. Enum. (1822) 12. — *Palimbria chabraei* β . *podolica* DC. Prodr. IV (1830) 176.

Perennial; root rather thick, ca. 1 cm wide, vertical, its neck covered with fibrous brown remnants of leaves; stem 50–120 cm high, erect, branching in upper half; radical leaves soon wilting, oblong, simple or nearly bipinnate, 7–20 cm long, 3–7 cm wide, primary lobes sessile or short-petioluled, ob-cuneate, lobes of the last order oblong or lanceolate, 0.5–1.5 cm long, 2–10 mm wide, acuminate, with slightly scabrous margin, shiny on both surfaces; median and upper leaves smaller, less dissected, sessile on long sheaths, uppermost leaves with reduced blade. Umbels of 11–25 unequal rays scabrous above; involucre lacking or of 1 caducous leaflet; umbellets ca. 1 cm across, their rays glabrous or obscurely scabrous above; involucels of 1–3 subulate, smooth leaflets; calyx-teeth inconspicuous; petals yellowish or yellowish-whitish, broadly ovate, ca. 1 mm long; fruit broadly ovoid, 4–5 mm long, 2.5–3.5 mm wide, nearly as long as pedicel; dorsal ribs filiform, the marginal winged, ca. 0.7 mm wide; stylopodium short-conical; styles recurved, as long as stylopodium. July–August.

Meadows, sometimes damp, shrubs, forests, forest edges. — European part: M. Dnp., U. Dns., V.-Don (SW), Bl., L. Don, Bes.; Caucasus: Cisc. Gen. distr.: Centr. Eur. (E.). Described from Podolia. Type in Leningrad.

196 30. *P. pschavicum* Boiss. Fl. or. II (1872) 1020; Grossg., Fl. Kavk. III, 180.

Perennial; root 5–8 mm thick, its neck densely covered with fibrous remnants of petioles; stems few or single, 15–80 cm high, ascending at base, becoming nearly erect, glabrous, ribbed, whitish, simple, very rarely with 1–2 branches; radical and lower cauline leaves with more or less long petioles passing into long sheath with scarious margin, their blade bi- or tripinnate, oblong, with 5–9 primary sessile lobes, secondary lobes dissected into linear or linear-lanceolate, acute, 2–12 mm long, 1–3.5 mm wide lobules with scabrous margin; upper leaves sessile on long sheath. Umbels 2–4 cm across, of 8–19 unequal rays scabrous above; lateral umbels, if present, smaller, of 6–10 rays; involucre lacking; involucels of 4–6 linear-subulate, thinly acuminate leaflets with scarious margin as long as umbellets or longer; petals white or violet; fruit broadly ovoid, 4–5 mm long, 3.5 mm wide; dorsal ribs filiform, the lateral with broad, ca. 1 mm wide wings; stylopodium short-conical; styles erect at first, becoming recurved, 1–1½ times as long as stylopodium. July–September.

Subalpine meadows and thinned-out mountain forests, 2,100–2,600 m. — Caucasus: Cisc., Greater Caucasus. Endemic. Described from Pshavia (near Lake Tana, 2,500 m). Type in Geneva.

31. *P. palimbioides* Boiss. Fl. or. II (1872) 1021; Grossg., Fl. Kavk. III, 182. — *Palimbia chrysantha* C. Koch in herb. non *Peucedanum chrysanthum* Boiss. — *Peucedanum tomentellum* Freyn in Oesterr. bot. Zeitschr. XLIV (1894) 101. — *P. t.* subsp. *P. fallax* Freyn l. c. (1894) 102. — *P. fallax* Woron. in Sched. ad Herb. Fl. cauc. Fasc. XI, No. 524 (1931). — *P. chrysanthum* Woron. in herb. non Boiss. — Exs.: Herb. Fl. cauc. No. 524.

Perennial; root thick, ca. 1 cm across, vertical, its neck densely covered with brown fibrous remnants of petioles; stems few or 1, 20–50 cm high, with slightly antrorse branches from base or middle, glaucescent-green, very dense, short hairs, rarely subglabrous, ribbed; radical leaves oblong, their petioles shorter than blade, expanding sheath; blade with 4–5 remote, sessile, primary lobes, bipinnatisect, very short-haired, secondary lobes deeply pinnatifid into linear mucronate lobules; cauline leaves sessile on oblong sheath, much smaller, less parted. Umbels 3–8 cm across, of 9–14
197 unequal smooth rays; involucre lacking; involucels of 2–5 unequal linear-lanceolate, acuminate or acute leaflets with narrow scarious margin; petals yellow; fruit ovoid, 5 mm long, 3 mm wide, with filiform dorsal and winged lateral ribs, wings ca. ¼ diameter of fruit. July–August.

Slopes. — Caucasus: possibly also in S. Transcaucasia. Gen. distr.: Arm.-Kurd. Described from Ardanuch. Type in Geneva.

Section 9. *TAENIOPETALUM* (Vis.) Rchb. fil. ex Calest. in Bullettino della Soc. bot. Ital. (1905) 198. — Gen. *Taeniopetalum* Vis. Fl. Dalm. III (1849) 49. — Terminal leaf lobes linear, entire, obtuse, with short mucro; petals with network of darker nerves; upper epidermis scabrous.

32. *P. borysthenticum* Klok. in Addenda XVI, 354. — *P. arenarium* Ldb. Fl. Ross. II, 309, non Waldst. et Kit.; Shmal'g., Fl. I, 409. — *Taeniopetalum borysthenticum* Klok. in sched. in herb. Leninopol.

Perennial; root ca. 1 cm thick, its neck densely covered with dark brown fibrous remnants of leaves; stem 80–150 cm high, erect, cylindrical, thinly ribbed, branching above; radical leaves with petioles much shorter than blade, broadly triangular, 30–40 cm long, 20–30 cm wide, ternately pinnatisect; primary and secondary lobes petioluled, lobules linear or lanceolate, 0.5–3.5 cm long, 0.6–1.7 mm wide, with very short whitish mucro, glabrous or with obscurely scabrous margin. Umbels 4–10 cm across, of 7–10 unequal glabrous rays, crowded in fruit; involucre of 1–5 lanceolate or linear antrorse leaflets with narrow scarious margin; umbellets ca. 8 mm across; involucels of 5–7 linear-lanceolate leaflets, shorter than pedicels; calyx-teeth broadly triangular, acute, indistinct; petals whitish-greenish, hardly notched, with inward curved tip; fruit broadly ovoid, 6–7 mm long, 5–5.5 mm wide, with filiform dorsal and winged, to 1 mm wide, lateral ribs; pedicels half length of fruit. July–August, Fr. October.

Riparian sands, steppe slopes, chalky hills. — European part: M. Dnp., Bl., L. Don. Endemic. Described from the Dnieper River. Type in Leningrad.

Section 10. XANTHOSELINUM (Schur) Calest. in Bullettino della Soc. bot. Italiana (1905) 200. — Gen. *Xanthoselinum* Schur, Enum. pl. Transs. (1866) 264. — Gen. *Petroselinum* Rchb. Fl. germ. excurs. (1832) 451, pro parte. — *Taeniopetalum* Bge. Beitr. zur Kenntn. der Flora Russl. (1851) 127, nec Vis. (1849). — Calyx-teeth conspicuous; 198 petals yellow, elliptic or obovate, notched; fruit ovoid, marginal wings half as wide as middle part of fruit; involucre multifoliate.

33. *P. lubimenkoanum* Kot. in Zhurn. Inst. bot Ukr. AN, 26–27 (1938) 187. — *P. alsaticum* Ldb. Fl. Ross. II, 312, non L.; Shmal'g., Fl. I, 409; Grossg., Fl. Kavk. III, 181; Kryl., Fl. Zap. Sib. VIII, 2047. — *Taeniopetalum peucedanoides* Bge. Beitr. zur Kenntn. der Flora Russlands (1851) 127.

Perennial; root vertical or ascending, 1–2.5 cm thick, its neck covered with dark brown remnants of leaves; stem 50–120 cm high, in large specimens to 2 cm thick, furrowed, glabrous, hollow, branching; lower leaves triangular, tripinnate, their petioles 10–15 cm long, blade 15–25 cm long, 10–20 cm wide, its lobes opposite, primary and secondary petioluled, tertiary partly sessile and deeply cut into oblong or lanceolate, short-acuminate, 3–10 mm long, 1.5–3 mm wide lobules, sometimes margin and lower side of midrib covered with short spines; upper leaves less dissected, smaller. Umbels 3–6 cm across, of 12–21 very unequal glabrous rays; involucre of 3–7 linear-lanceolate, long-acuminate, spreading or recurved leaflets with white-membranous margin; involucels of 5 lanceolate-linear, acute, unequal leaflets; calyx-teeth triangular, acute; petals pale yellow; fruit ellipsoid or oblong, 4.5–5 mm long, 3.5–4 mm wide; stylopodium short-conical, with undulant base; styles recurved, slightly longer or $1\frac{1}{2}$ times as long as stylopodium; canals solitary in valliculae, 2 toward commissure. June–July.

Oak and pine forests, forest edges, groves, shrubs, solonchik meadows, feathergrass-sheep's fescue and shrubby steppes, slopes of ravines, occasionally in pastures and gardens. — European part: M. Dnp., V.-Don, V.-Kama, L. Don, Transv., L. V., Bl., Bes. (?), U. Dns., Crim.; Caucasus: Cisc. (W.); W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp. (N.), Balkh. (N.). Endemic (?). Described from the Ukraine. Type in Kiev.

Note. Bunge (l. c.) proposed the new name because he considered Linnaeus' *alsaticum* inapplicable to a species as widespread as this; inasmuch as his plant is, in his opinion, indistinguishable from the West European plant, we must reject his epithet for the species growing in the USSR.

Section 11. JORENIOIDEA Schischk. sect. nov. in Addenda XVI, 355. — Calyx-teeth inconspicuous; petals yellow; fruit broadly obovoid, dorsal ribs 199 filiform, the marginal narrowly winged; 1–3 canals per vallecule; upper cauline leaves reduced to sheaths; involucre lacking, involucels of linear-lanceolate leaflets.

34. *P. paucifolium* Ldb. Fl. Ross. II (1844) 312. — *P. meyeri* Boiss. Fl. or. II (1872) 1018; Grossg., Fl. Kavk. III, 183. — *P. conrathii* Freyn in Bull. Herb. Boiss. III (1895) 305; Grossg., Fl. Kavk. III, 181. — *Ferrula seseloides* C. A. M. Verzeichn. Pfl. Kauc. (1831) 126, non *Peucedanum seseloides* Turcz. — *Johrenia meyeri* Boiss. in Ann. Sc. nat. sér. III Botan. (1844) 307. — Exs.: Pl. orient. exsic. No. 67.

Perennial; root thick, 1–2 cm across, its neck covered with remnants of petioles; entire plant glabrous, glaucescent-green; stem single, 50–90 cm high; erect, cylindrical, furrowed, with obliquely antrorse branches above; radical and lower cauline leaves with petioles shorter or longer than blade; blade oblong, 7–10 cm long, 3–5 cm wide, bipinnatisect, with 4–5 remote primary lobes; lobes of the last order linear, entire or pinnatisect into linear lobules; upper leaves reduced to linear-subulate sheath. Umbels of 5–15 very unequal glabrous rays; involucre lacking; involucels of 3–7 linear-lanceolate, erect or recurved leaflets; umbellet rays glabrous; petals yellow; fruit broadly obovoid, 5 mm long, 4 mm wide, with filiform dorsal and broad-winged marginal ribs; canals 1–3 per vallecule; stylopodium conical; styles recurved, half as long as stylopodium. July.

Stony and dry herbaceous slopes, shrubs. — Caucasus: E. and S. Transc., Tal. Gen. distr.: Iran. Described from E. Georgia. Type in Leningrad.

Section 12. FERULOIDEA Schischk. sect. nova in Addenda XVI, 355. — Calyx-teeth triangular; petals yellowish-greenish; flowers polygamous; fruit ellipsoid or ovoid-ellipsoid, with filiform dorsal and hardly dilated marginal ribs.

35. *P. adae* Woron. in Tr. Peterb. obshch. estestvoisp. XXXIV (1905) 27 and in Spisok rast. Gerb. russkoi flory, VI (1908) 44; Grossg., Fl. Kavk. III, 182. — Exs.: G. R. F. No. 1714.

Perennial; root vertical or ascending, ca. 10 mm thick, its neck densely covered with fibrous remnants of leaves; stem single, 100–140 cm high, thinly ribbed, branching in upper half; radical leaves with long (15–20 cm) petioles, their blade ovate, 25 cm long, 15 cm wide, tri- or quadripinnatisect, sometimes appearing ternately dissected, with remote lower pair of primary lobes; 200 lobes of the last order ovate or oblong-ovate, cuneately tapering, incised beyond their middle; lower cauline leaves similar to radical but terminal lobe narrower and more elongated, median leaves simple-pinnate, the uppermost entire, linear-spatulate. Umbels 5–7 cm across, of 5–8 unequal smooth rays, lateral umbels smaller; involucre of 5–7 unequal antrorse, linear-lanceolate, acute leaflets; umbellets 5–7 mm across; involucels of 5–7 linear-lanceolate leaflets, shorter than pedicels; flowers polygamous; calyx-teeth small, triangular, acute; petals yellowish-greenish; fruit ellipsoid or ovoid-ellipsoid, tapering above and below, with filiform dorsal and slightly ciliate marginal ribs; canals 1 per vallecule, 2 toward commissure; stylopodium short-conical. July.

Light forests, mainly oak forests, on limestone soil. — Caucasus: W. Transc. (Abkhazia). Endemic. Described from Kodor River gorge and Bzyb Range. Type in Leningrad.

Section 13. MEMBRANACEA Boiss. Fl. or. II (1872) 115. — Calyx-teeth inconspicuous, petals whitish, mericarps with narrow marginal wings, 1 canal per vallecule, involucre and involucels multifoliate with membranous margin, or entire.

36. *P. pauciradiatum* Tamamsch. in Act. Inst. bot. Ac. Sc. URSS, ser. I, Flora et system. III (1936) 225. — *P. albostriatum* Karjag. in Izv. Azerb. fil. AN SSSR, No. 5 (1940) 39.

Perennial; root thick; entire plant pale green; stem 70–80 cm high, single, furrowed, with obliquely antrorse branches nearly from base; radical leaves many, their petioles $\frac{1}{3}$ to $\frac{1}{2}$ length of blade, expanding to short sheath, their blade triangular, 10 cm long, 15 cm wide, bipinnatisect, primary lobes petioluled, oblong or oblong-elliptic, pinnatisect into trilobate acuminate lobules, terminal lobule 3–5-lobed; lower cauline leaves with blade, the rest reduced to nearly entirely membranous, lanceolate sheath. Umbels of 3–5 unequal rays; involucels of 5–6 lanceolate, acuminate leaflets with membranous margin, much shorter than umbellet rays; involucels of 5–6 leaflets with narrow membranous margin, lanceolate, acuminate; calyx-teeth inconspicuous; petals greenish pink at first, becoming whitish, with inward curved tip; fruit broadly ovoid, with narrow equal ribs; canals solitary in valleculae, 2 toward commissure; stylopodium flattened-conical; styles longer than stylopodium, ultimately diverging. June–July.

201 Caucasus: S. Transc. Endemic. Described from near Ordubad. Type in Erivan.

Note. As the ripe fruit is not known, the inclusion of this species in this section is tentative; nor are we quite certain that it belongs to *Peucedanum*.

Section 14. *THYSSELINUM* (Hoffm.) Rchb. Handb. d. Gewächsk. (1827) 448. — Gen. *Thysselinum* Hoffm. Umbell. I (1814) 154, non Adans. (1763). — Gen. *Calestania* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 176. — Calyx-teeth distinct, petals short-clawed, obovate, notched, fruit with rather broad, thickish, marginal wings, leaf lobes of the last order linear or lanceolate-linear.

37. *P. palustre* (L.) Moench, Meth. (1794) 82; Ldb. Fl. Ross. II, 240; Shmal'g., Fl. I, 408. — *P. sylvestre* DC. Prodr. IV (1830) 179. — *P. schiwereckii* Eichw. Skizze (1830) 155. — *Selinum palustre* L. Sp. pl. (1753) 244. — *S. silvestre* L. l.c. (1753) pre parte. — *S. thysselinum* Crantz, Stirp. Austr. (1767) 170. — *S. lactescens* Lam. Fl. Franc. III (1779) 418. — *S. sublactescens* Gilib. Fl. lithuan. II (1782) 21. — *S. intermedium* et *S. schiwereckii* Bess. Prim. Fl. Galic. I (1809) 205. — *Athamanta* ? *pisana* Savi in Ust. Ann. Bot. XXI (1800) 7. — *Thysselinum palustre* Hoffm. Umbell. I (1814) 154. — *Th. plinii* Spreng. Umbell. (1818) 69. — *Th. schiwereckii* Bess. Enum. pl. Volhyn. (1822) 12. — *Th. angustifolium* et *Th. silvestre* Rchb. Fl. germ. Excurs. (1832) 453. — *Callisace cantabrigiensis* Hoffm. ex Steud. Nomencl. ed. I (1841) 138. — *Calestania palustris* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 175; Voron. in Fl. Yugo-Vost. V, 825; Kryl., Fl. Zap. Sib. VIII, 2053. — Ic.: Voronov, Fl. Yugo-Vost. V, Figure 540. — Exs.: G. R. F. No. 2609; Fl. polon. exs. No. 437.

Perennial; stem 4–12 mm thick below, 50–120 cm high, ribbed, hollow, usually dark violet at base, branching in upper part, like leaves glabrous; lower leaves with long petioles passing into short, broadly triangular sheath, 7–40 cm long, 3–40 cm wide, bi- or tripinnate, primary and secondary leaflets petioluled, tertiary sessile, deeply pinnatifid into linear or lanceolate-linear, cartilaginous-acuminate lobules with smooth or slightly scabrous margin, 8–15 mm long, 1–3 mm wide. Terminal umbels larger than lateral, 5–10 cm across, of 15–30 rays short-stiff-hairy above; involucels of 7–12 ovate-lanceolate or lanceolate-linear, long-acuminate, recurved leaflets with membranous margin; involucels of 7–12 linear leaflets nearly as long as umbellets; umbellets ca. 2 cm across, with short-scabrous pedicels; calyx-teeth short; petals white, subrounded, notched, ca. 1.5 mm long and as wide; fruit broadly ellipsoid, 5 mm long, 3 mm wide, with slightly protruding, obtuse, median and narrowly winged marginal ribs; canals solitary in valliculae, 2 toward commissure. Fl. July–August, Fr. August–September.

Gypsum-sedge and peat bogs, swampy meadows, alder forests, banks of lakes and streams. — European part: Dv.-Pech., Lad.-Ilm., Balt., U. Dnp., U. V., V.-Kama, M. Dnp., V.-Don, L. Don, U. Dns.; W-Siberia: Ob, U. Tob., Irt. (N.), Alt. (N.). Gen. distr.: Scand., Centr. Eur., Bal. (N.). Described from W. Europe. Type in London.

Section 15. *GLAUCOSELINUM* Schischk. sect. nov. in Addenda XVI, 355. — Calyx-teeth triangular, obtuse; petals broadly ovate, hardly notched, yellow; fruit ovoid, with filiform dorsal and slightly enlarged marginal ribs; leaves ternatisect, with ovate terminal lobules.

38. *P. transiliense* Herd. in Bull. Soc. Nat. Mosc. XXXIX, III (1866) 78.

Perennial; root thick, ca. 10 mm across, its neck densely covered with remnants of leaves; stems usually few, 80–90 cm high, erect, cylindrical, furrowed, glabrous, glaucescent; leaves ovate, triangular, tripinnatisect, primary lobes more or less long-petioluled, lobes of the last order ovate or lanceolate, entire or tripartite with rolled margin, attenuate at base, acuminate, 0.3–3 cm long, 1–5 mm wide; cauline leaves smaller, sessile on inflated sheath. Umbels of 16–20 unequal smooth rays; involucre of 1–2 caducous leaflets; umbellets of 10–15 very unequal glabrous rays; involucels lacking; calyx-teeth triangular, obtuse; petals yellowish, ca. 1 mm long, hardly notched; fruit ovoid, 8–10 mm long, 4–5 mm wide, with thin filiform dorsal, narrowly and obscurely winged marginal ribs; stylopodium short-conical; styles recurved, shorter than stylopodium. Fl. June, Fr. July–August. (Plate XVIII, Figure 2.)

Turf-covered, stony mountain slopes, to 3,300 m. — Centr. Asia: T. Sh., Dzu.-Tarb. (S.), Pam.-Al. Endemic. Described from Zailiiski Ala-Tau, Kurmekty pass, 2,100 m. Type in Leningrad.

39. *P. polyanthum* Korov. comb. nov — *Ferula polyantha* Korov. Monogr. (1947) 55.

Perennial; glaucous, glabrous plant, with neck enveloped in fibers; stem single, 30–40 cm high, thinly furrowed, with alternate branches from middle or below overtopping main stem; leaves coriaceous when dry, slightly wilting, radical leaves with flattened petioles expanding at base, their blade triangular, ternatisect, its segments pinnatisect into oblong-oval, pinnate-lobate decurrent lobules 3 cm long, 1.5 cm wide, sections rounded; cauline leaves much smaller, with short oblong-lanceolate sheath and acutely dentate lobules. Umbels on lateral branches and at stem apex; central umbel with fertile bisexual flowers of 10 divaricate, 6–7 cm long rays; lateral umbels staminate; umbellets dense, globular, 36-flowered, with involucels of 10 herbaceous, lanceolate-linear, obliquely connate leaflets; calyx-teeth indistinct; petals yellow, rounded, with short inward curved tip, 1 mm long; stylopodium short-conical, expanding at base; styles short, deflexed; ovary half length of pedicels, oblong; canals solitary in valliculae, 2 toward commissure. May.

Slopes. — Centr. Asia: Syr D. (Fergana valley). Endemic. Described from Shakhimardan River and from near Kokand. Type in Leningrad.

Note. In the absence of fertile specimens, the position of this species in the system of the genus is uncertain.

Genus 1063 **OEDIBASIS*** K.-Pol.**

K.-Po., in Bull. Soc. Nat. Mosc. N.S. XXIX (1915) 175

Flowers bisexual, calyx edentulate, petals white, equal, broadly elliptic, folded along midrib, notched, with short inward curved tip; stylopodium

*Treatment by E.P. Korovin.

**From the Greek oedōs—swelling, tumor; basis—base, referring to the tuberos dilation of the stem base.

short-conical; styles contracted, deflexed; fruit dorsally compressed, thickened toward apex, linear, mericarps broadly connate with prominent filiform and narrowly rimmed lateral ribs; resinous canals 1 per vallecule, 2-4 toward commissure; carpophore partite above; seeds flat inside; pericarp thin, coriaceous, with distinct stereome in each rib, marginal mestomes near seed. One-to two-stemmed monocarpic herbs; root a superficial tuber; leaves multisect into narrow lobules; umbels and umbellets with involucre and involucels; cotyledons 2.

204 Four species, in Centr. Asia. The position of the genus in the family is based on its broad fruits and the histologically homogeneous pericarp. It is closest to *Peucedanum* L. from which it differs primarily by being geophilous. All four species occur in the lower mountain belt; *O. apiculata* (Kar. et Kir.) K.-Pol. descends to dry steppe plains.

1. Radical leaves in more or less dense rosette, stem with basal leaves only 2.
- + Radical leaves 1-2, stem leafy nearly to apex 4. *O. platycarpa* (Lipsky) K.-Pol.
2. Plant glabrous, leaves dissected into long (to 20 mm) filiform lobes 2. *O. karatavica* Korov.
- + Plant pubescent 3.
3. Terminal sections of leaves elliptic or lanceolate 1. *O. apiculata* (Kar. et Kir.) K.-Pol.
- + Terminal sections of leaves capilliform, to 2 mm long 3. *O. chaerophylloides* (Rgl. et Schm.) Korov.

1. *O. apiculata* (Kar. et Kir.) K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 175. — *Carum apiculatum* Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 358; Ldb. Fl. Ross. II, 250. — *Bunium apiculatum* Drude in Engl. Pflanzenfam. III, 8 (1898) 194. — *Peucedanum rapi-ferum* Trautv. in Bull. Soc. Nat. Mosc. XXXIX (1866) 326.

Perennial; tuber spherical; stem and leaves pale green, stem 30-50 cm high, soft-hairy below, cylindrical, smooth, branching from middle to produce corymbiform panicle, upper branches sometimes overtopping central umbel; radical leaves often few in rosette, lower half of petiole expanded to elongate, flattened sheath; blade oblong-lanceolate, pinnatisect into thickish, opposite, sessile, elliptic or oblong-elliptic, incised, acutely toothed, ca. 15 mm long, 8 mm wide sections; cauline leaves, especially the upper, sessile, often bipinnatisect, their terminal sections lanceolate, pinnatifid or parted into narrow acute lobules. Umbels of 11-18(25) divergent, unequal, to 6 cm long rays; involucre of 6-8 linear, nearly membranous leaflets; umbellets 20-30-flowered, with involucels of 10 linear, acute connate leaflets, as long as pedicels; petals broadly elliptic, 2 mm long; stylopodium short-conical; styles as long as stylopodium; fruit glaucescent, broadly linear, thickened at apex, with prominent whitish ribs, 6-6.6 × 1.5-1.7 mm; mericarps with narrow whitish border; resinous canals narrow in furrows. May-August. (Plate XIX, Figure 1; Plate XXI, Figure 3.)

207 Clayey outliers in semidesert zone, also loessial hills and foothills. — Centr. Asia: Balkh., Ar.-Casp., T. Sh. (Kirghiz, Talass, Tashkent Ala-Tau, Kara-Tau Mountains). Endemic. Described from sands between Arganat'y and Chingil'dy and the Lepsy River. Type in Leningrad.



PLATE XIX. 1 — *Oedibasis apiculata* (Kar. et Kir.) K.,-Pol.; 2 — *Korovinia tenuisecta* (Rgl. et Schmalh.) Nevski et Vved.

Note. Notwithstanding its wide distribution, this species is fairly constant. In southern populations the leaves tend to be much more dissected than in the rest of the distribution area.

2. *O. karatavica* Korov. in Addenda XVI, 355.

Perennial; tuber oblong, entire or lobed; stem 40–50 cm high, thinly furrowed, corymbiformly branching from base or middle, leaves not wilting soon; radical leaves numerous, crowded in rosette, short-petioled, their blade oval-lanceolate, tripinnatisect into erect, filiform, mucronate sections to 6 mm long; cauline leaves sparse, smaller, their triangular sections to 20 mm long; upper leaves reduced to short sheaths. Umbels flat, of 8–11 rays to 60 mm long, the outer longer than the inner; involucre of 3 linear leaflets; umbellets 20-flowered; petals subrounded, deeply notched, 1.9 mm long; stylopodium short-conical; styles 2 mm long; fruit (unripe) linear, flattened at apex, 6.4 mm long; mericarps with sharply protruding ribs and canals between them, and distinctly broadened margins, resinous canals broad. May–June.

Stony-clayey mountain slopes in lower belt. — Centr. Asia: T. Sh. Endemic. Described from Kara-Tau Range. Type in Tashkent.

3. *O. chaerophylloides* (Rgl. et Schm.) Korov. comb. n. — *Carum chaerophylloides* Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 587. — *Carum tamerlani* Lipsky in Tr. Bot. Sada, XXIII (1904) 129.

208 Perennial; root with thickened, radish-shaped tuber; plant glabrous, often soft-hairy; stem to 60 cm high, its neck covered with remnants of leaves cylindrical, distinctly furrowed, branching above to produce spreading, corymbiform panicle, branches often overtopping terminal umbel; radical leaves in dense rosette, with short hairy petioles dilated into sheaths, their blade oblong-lanceolate, acuminate, pinnatisect, terminal lobes sessile, bipinnate and deeply parted into short, dense, narrow, filiform, 1.5–2 mm long, mucronate lobules; cauline leaves with reduced, less complex blade, the upper reduced to squamiform sheath. Umbels of 23 unequal, slightly curved, to 60 mm long rays; involucre of 8 lanceolate or linear-lanceolate leaflets; umbellets 20-flowered; involucre of 10 broadly lanceolate leaflets with membranous margin; petals broadly elliptic, deeply notched, 1.5 mm long; stylopodium short-conical; styles about as long as stylopodium; fruit glaucous, linear, 7 mm long, 1.2 mm wide; mericarps with sharply protruding ribs and broadened margins; resinous canals narrow. May–July. (Plate XXI, Figure 4.)

On products of weathering of gypsiferous and Cretaceous Tertiary rocks, in lower semidesert, rarely steppe belts. — Centr. Asia: T. Sh. (Tashkent Ala-Tau), Pam.-Al. (western spurs of Gissar Range, Mogol-Tau Mountain, Kugitang Mountains). Endemic. Described from Centr. Asia. Type in Leningrad.

4. *O. platycarpa* (Lipsky) K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 175. — *Carum platycarpum* Lipsky in Tr. Bot. Sada, XXIII (1904) 132. — *Bunium platycarpum* Wolff in Engl. Pflanzenr. IV, 228 (1927) 208.

Perennial; tuber ovoid, entire; stem to 1 m high, cylindrical, slightly furrowed, glabrous, corymbiformly branching in upper third, branches

usually overtopping terminal umbel; radical leaves 1–2, soon wilting, with long petioles gradually expanding toward base, leaf blade oval-lanceolate, loose, branching, multipinnatisect into soft, early wilting, subcapilliform, 5–8 mm long lobes, obsolete in upper leaves. Umbels flat, with involucels of 8–10 linear leaflets with membranous margin, umbel rays unequal, to 60 mm long; umbellets 25–30-flowered, leaflets of involucels 10, nearly as long as pedicels; petals broadly obovate, deeply notched, 2 mm long; stylopodium conical; styles slightly longer than stylopodium; fruit linear, 6 mm long, 1.2 mm wide; mericarps with sharply protruding ribs; resinous canals narrow. May–June. (Plate XXI, Figure 5.)

Soft herbaceous mountain slopes in steppe belt, wheatgrass-forb steppes.—Centr. Asia: T. Sh. (Talass Ala-Tau, Kara-Tau, Tashkent Ala-Tau). Endemic. Described from the valley of the Chimgan and Pskem rivers. Type in Leningrad.

Genus 1064. **ANETHUM** * L.

L. Sp. pl. (1753) 263

Calyx-teeth very short or lacking; petals yellow, with inward curved tip; fruit ovoid or broadly ellipsoid, compressed dorsally; mericarps with 3 filiform, more or less protruding, carinate, dorsal ribs, lateral ribs with thin, yellowish margin; canals solitary under valliculae, 2–4 toward commissure; stylopodium short-conical or pulviniform; styles erect, short at first, recurved in fruit; albumen semi-elliptic in cross section, nearly flat toward commissure. Annual, rarely biennial herbs, with strongly cut leaves.

Three species, E. Mediterranean area to India.

1. Umbels of 30–50 rays, involucre and involucels lacking 1. *A. graveolens* L.
- + Umbels of 5–9 rays, involucre and involucels of 3–5 leaves 2. *A. involucratum* Korov.

1. *A. graveolens* L. Sp. pl. (1753) 263; DC. Prodr. IV, 186; Ldb. Fl. Ross. II, 317; Boiss. Fl. or. II, 1026; Grossg., Fl. Kavk. III, 170. — *A. arvense* Salisb. Prodr. (1796) 168. — *A. sowa* Roxb. ex Flem. in As. Res. XI (1810) 156. — *Selinum anethum* Crantz, Class. Umbell. emend. (1767) 60; Roth, Tent. Fl. germ. I (1788) 134. — *S. graveolens* Vest, Man. Bot. (1806) 501. — *Pastinaca graveolens* Bernh. Syst. Verz. Erf. (1800) 171. — *P. anethum* Spreng. in Schult. syst. VI (1820) 587. — *Ferula graveolens* Spreng. in Umbell. Prodr. (1813) 14. — *F. maratophylla* Walp. in Nov. Act. Nat. Cur. XIX Suppl. I (1843) 347. — *Angelica graveolens* Steud. Nomencl. ed. 2 (1841) 555, in syn. — *Peucedanum sowa* Kurz in Journ. As. Soc. Beng. XLVI, II (1877) 116. — *P. anethum* Jessen, Deutsche Excursions-Fl. (1879) 180; Shmal'g. Fl. I, 411. — *P. graveolens* Clarke in Hook. f. Fl. Brit. Ind. II (1879) 709. — Ic.: Syreishchikov, Illyustr. Fl. Mosk. gub. II (1907) 417. — Exs: G. R. F. No. 2602.

* From the Greek *ana* — through, *ethein* — burn, referring to the burning taste of the fruits. Others derive the name from the Greek *anethon*, Aristophanes' name for the plant which is closely similar to anison, from the Greek *aeni* — fragrance.

Annual; entire plant glabrous, dark green, with distally indistinct blue striae with pungent spicy odor; root thin, fusiform; stem 40–120 cm high, single, erect, branching or nearly simple, thinly furrowed, with alternate narrow whitish and green striae, branching above, curved between branches; leaves tri- or quadripinnate, ovate, lobules of last order linear-filiform or nearly setaceous; lower leaves with petiolules expanding to oblong, 1.5–2 cm long sheath with broad scarious margin; upper leaves with smaller and less dissected blade, sessile on sheath. Umbels to 15 cm across, of 30–50 smooth, nearly equal rays; involucre and involucels lacking; calyx-teeth very short; petals yellow, tapering to flat, hardly notched involute lobule; stylopodium pale yellow, pulviniform; styles very short, nearly erect at
210 flowering, becoming recurved in fruit, stigma claviform-capitate; fruit ovoid or broadly ellipsoid, dorsally compressed, 3–5 mm long, 1.5–3.5 mm wide; mericarps with 3 prominent, carinate, dorsal ribs, lateral ribs extended into thin, straw-colored margin; canals solitary in valliculae, 2 toward commissure; albumen semi-elliptic in cross section, nearly flat toward commissure. June–July.

Cultivated and escaped near dwellings, kitchen gardens, fields and roads. — European part: Lad.-Ilm., Balt., U. Dnp., M. Dnp., U. Dns., Bes., V.-Don, L. V.; Caucasus: Cisc., W., E. and S. Transc., Tal.; Centr. Asia: Ar.-Casp., Syr D., Pam.-Al., Mtn. Turkm. Gen. distr.: (wild) As. Min., Iran., Ind.-Him., N. Afr. (Egypt); (weed) W. and E. Med., S. Afr., cultivated and escaped in Centr. Eur., Atl. Eur., Bal., N. Am., E. India, Chile, Paraguay, and others. Described from fields in Portugal and Spain. Type in London.

Economic importance. The boiled fruits were used for medical purposes by the ancient Greeks, Hebrews, and others. Although hardly used for such purposes today, the plant is valuable for the essential oil obtained by steam distillation of the crushed fruits. (The main component of the 2.8–4% essential oil is carvone, 40–60%.) In storage the initially colorless oil turns yellow and its taste changes from delicate to very sharp. The odor of dill oil is reminiscent of caraway oil. The fruit is picked before ripening, as it crumbles when ripe. The essential oil is used in the manufacture of soap and liqueurs; the oil cake (15 to 20% protein, about 15% fat) is a good cattle feed. The green parts of the plant also contain essential oil; this too is used for industrial purposes in some countries (Spain). The young shoots are used as vegetables, often as a seasoning for food and pickles.

2. *A. involucratum* Korov. in Not. syst. Inst. botan. et zoolog. Acad. Sc. Uzbekistan. VIII (1947) 11.

Perennial; taproot with neck covered with fibers of dead leaves; stem and leaves glaucescent, 50–60 cm high, thinly furrowed, branching at middle to produce corymbiform panicle; branches alternate, upper opposite, over-topping terminal umbel; leaves glabrous, radical persistent, sessile on lanceolate, white striated sheaths, their blade sparse, thrice ternately dissected into narrow linear, 15–20 mm long, acute sections; cauline leaves
211 reduced to narrow sheaths. Umbels of 5–9 erect rays, outer to 5 cm long, much longer than inner; involucels of 5 short, lanceolate leaflets; umbellets 10–15-flowered, involucels of 3–5 narrow lanceolate leaflets $\frac{1}{4}$ length of pedicels; flowers on unequal, erect, thin pedicels; calyx edentulate; petals

yellow, elliptic, with inward curved tapering tip, 1.4 mm long; stylopodium short-conical; styles slightly longer than diameter of stylopodium, recurved; fruit (unripe) oblong, cuneate at base, fringed by narrow rim, 3.5 mm long; ribs filiform; resinous canals 1 per vallecule; broad, 2 large and 2 small toward commissure, interrupted. June.

Nonirrigated wheat fields. — Centr. Asia: Pam.-Al. Endemic. Described from W. Pam.-Al. Type in Tashkent.

Note. In the absence of specimens, the present description follows Korovin. It is doubtful whether it should be included in *Anethum*.

Genus 1065. **KOROVINIA** * Nevski et Vved.

Nevski et Vved. in Tr. Bot. inst. AN SSSR, ser. 1, IV (1937) 242

Flowers bisexual, calyx edentulate, petals yellow, elliptic, tapering toward apex, inward curved; stylopodium flattened-conical, sometimes with expanded base; styles short, reflexed; fruit more or less flattened dorsally, entire inner surface of mericarps connate with whitish, slightly thickened rim along margin, ribs filiform, resinous canal 1, rather wide in vallecule, 6–8 toward commissure, of these 2 wide, others narrow, interrupted; carpophore free; seeds flat toward commissure; mesocarp of 2 layers, inner flattened, outer thickened, spongy, of aerial parenchyma, mestomes disposed in outer layer, stereomes lacking. Perennial, polycarpic herbs, with thickened, cylindrical root; leaves dissected into narrow sections; umbels with involucre and involucels.

In the structure of the pericarp and many other features, *Korovinia* is close to *Johrenia* DC., from which it distinctly differs by the well-defined resinous canals in the fruits and the tuberiform root. The flowers are identical with those of *Muretia* Boiss.

Three related species are known.

1. Stem corymbiformly branching 2.
- 12 + Stem paniculately branching 3. *K. microcarpa* Korov.
2. Plant with foul-smelling root, umbel rays 10–30 mm long
- 2. *K. ferganensis* Korov.
- + Root odorless, umbel rays $1\frac{1}{2}$ times as long
- 1. *K. tenuisecta* (Rgl. et Schm.) Nevski et Vved.

1. *K. tenuisecta* (Rgl. et Schmalh.) Nevski et Vved. l. c. 273. — *Peucedanum tenuisectum* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestv. antrop. i etnogr. XXXIV, 2 (1882) 37. — *P. tenuisectum* ssp. *typicum* Korov. in Schedis ad Herb. Fl. As. Med. 2 (1921) 28. — *Johrenia platypoda* Aitsch. et Hemsl. in Trans. Linn. Soc. Lond. III, 1 (1888) 71. — Ic.: Aitsch. et Hemsl. l. c. tab. XXIX. — Exs.: H. F. A. M. No. 38.

Perennial; entire plant glabrous, pale green; root cylindrical, often thickened below, with thin lateral roots; stem 40–60 cm high, its neck covered with fibrous remnants of leaves, thinly furrowed, with whitish, parallel

* Treatment by E. P. Korovin.

nerves, erect, 1–2 times branching from middle to produce more or less corymbiform panicle; branches thin, divergent, upper often opposite; leaves soon wilting and disintegrating; rosette of few leaves with short petioles passing into long, flat, linear sheath, and broadly triangular, ternately dissected blade, its segments bipinnatisect into narrow linear, flat, spreading sections $20\text{--}40 \times 0.6$ mm; cauline leaves with coriaceous, inflated, lanceolate, obliquely amplexicaul, shiny sheath, whitish inside, ca. 50 mm long, 155 mm wide; upper leaves reduced to short, narrow, lanceolate sheath. Umbels more or less compressed, of 6–10 unequal erect, 10–40 mm long rays, inner sometimes obsolete; involucre of 5 short, lanceolate-linear leaflets; umbellets 15-flowered, sterile, often with inner flowers; involucels similar to involucre, their leaflets much shorter than thin pedicels; calyx edentulate; petals with thickened midrib, 0.9 mm long; fruit ellipsoid or obovoid, 6×3.5 mm, brown, with whitish, narrow, winged rim, half length of longest pedicels; mericarps compressed dorsally, with filiform, whitish ribs, lateral ribs coincide with margin of seeds; resinous canals solitary, broad in furrows, 2 broad and 4–6 narrow, interrupted toward commissure. June–July. (Plate XIX, Figure 2; Plate XXI, Figure 6.)

Loessial hills in foothill zone, ephemeral cover of mountain semideserts, rarely higher in steppe belt. — Centr. Asia: T. Sh. (Kara-Tau, Tashkent Ala-Tau Mountains), Pam.-Al. (western spurs of Gissar Range, Kugitang 213 Mountains), Syr D., Mtn. Turkm. (Badkhyz). Gen. distr.: Iran (N. Afghanistan, Parapamiz). Described from Kara-Tau Mountains (Boroldai) near Tashkent, and elsewhere. Type in Leningrad.

Note. The dimensions of the fruits are variable. Within the distribution area there occur among the typical, large-fruited forms also plants with fruits 4.5–5 mm long. (Elevations in the Samarkand area.)

2. *K. ferganensis* Korov. in Bot. Mat. gerb. Inst. Bot. i Zool. AN UzSSR, VIII (1947) 10.

Perennial; pale green, completely glabrous plant; root thickened, cylindrical, rounded below, bearing thin rootlets; stem 50–60 cm high, furrowed, with whitish parallel nerves, corymbiformly branching in upper part, its neck covered with erect bristles — remnants of dead leaves; leaves soon wilting and disintegrating; radical leaves with long, cylindrical petioles expanding at base, their blade triangular-oval, ternate, its segments tripinnatisect into narrow linear sections to $5\text{--}0.5$ mm [sic] wide, diverging at an acute angle; cauline leaves with coriaceous, broad, flat, lanceolate, amplexicaul sheath, shiny inside, to 40×15 mm; upper leaves reduced to short, narrow, lanceolate sheath. Umbels more or less compressed, of 7–11 unequal rays, inner shorter, 10–30 mm; involucels of 5 short, lanceolate-linear, acute leaflets; umbellets of 12–15 fertile flowers, with involucre similar to involucre; pedicels unequal; calyx edentulate; petals convolute, 0.6 mm long; stylopodium flattened-conical, with enlarged, undulant margin, accrescent in ripe fruit; fruit ellipsoid, markedly inflated dorsally, much shorter than stalks; mericarps with filiform, slightly protruding ribs and narrow white rim; resinous canals solitary in furrows, medium-sized, 8 very narrow canals toward commissure. June–July.

Soft, loessial mountain slopes in steppe belt, wheatgrass steppes. — Centr. Asia: T. Sh. Endemic. Eastern part of Fergana valley. Type: E. Fergana, Kugart-Su River, Korovin No. 37, in Tashkent.

Note. Distinguished from the preceding species by the disagreeable odor of the root, the dimensions of the umbels, the shorter leaf sections, and the structure of the stylopodium and fruits.

3. *K. microcarpa* Korov. comb. n. — *Peucedanum tenuisectum* ssp. *microcarpum* Korov. in Sched. ad. Herb. Fl. As. Med. II (1924) 28.

Perennial; pale green, completely glabrous plant; root short-cylindrical, rounded below; stem ca. 1 m high, erect, furrowed, with parallel whitish nerves, its neck covered with fibers of dead leaves, branching in upper third to produce spreading panicle, branches thin, bearing few, often opposite branchlets; leaves soon wilting and disintegrating; radical leaves with long petioles passing into narrow sheath, their blade spreading, broadly triangular, tripinnatisect into narrow linear, erect sections to 15×0.6 mm; cauline leaves on coriaceous, oval-lanceolate, amplexicaul, flat sheath, shiny inside; upper leaves reduced to short, lanceolate, membranous scale. Ripe umbels compressed, of 4–6 unequal, very thin, 10–30 mm long rays; involucre of 5 short, appressed, lanceolate leaflets; umbellets with 8–10 sterile inner flowers, involucre similar to involucre; calyx edentulate; petals ovate, with inward curved tip, 0.6 mm long; stylopodium flattened-conical, expanding at base; fruit ellipsoid, half length of pedicels, 3.5 mm long; mericarps dorsally inflated, with hardly protruding filiform ribs, fused canals and inconspicuous rim; one large and several small interrupted canals between ribs, up to 8 canals toward commissure. May–June.

Clayey and clayey-stony slopes in steppe and semisteppe belts. — Centr. Asia: Mtn. Turkm. (C. Kopet Dag). Endemic. Described from Kopet Dag. Type in Tashkent.

Note. Close to *K. ferganensis* Korov. from which it is easily distinguished by the broad paniculate manner of branching, the much compressed umbels, and the fruits without broadened rim.

Genus 1066. **MOGOLTAVIA** Korov.

Korovin in Bot. mat. gerb. Inst. Bot. i Zool. AN UzSSR, VIII (1947) 11

Flowers bisexual; calyx edentulate; petals white, ovate, slightly depressed, with short inward curved tip; stylopodium flattened-conical, with undulant basal ridge; styles short; fruit dorsally compressed, thickened toward apex, with broad commissure, dorsal ribs filiform, lateral expanding into rim; carpophore free; resinous canals in two rows, outer row of broad canals, 1 per vallecula, inner many, narrow; 4 broad canals toward commissure; pericarp coriaceous, mesocarp homogeneous, parenchymatous. Perennial herbs, with tuberiform root and tripinnatisect leaves.

Monotypic genus, from the Mogol-Tau Mountain in Central Asia.

1. *M. severzovii* (Rgl.) Korov. l. c. (1947) 11. — *Carum severzovii* Rgl. in Tr. Bot. Sada, V, 2 (1878) 587, 588. — *Bunium severzovii* Drude in E. u. P. Pflanzenfam. III, 8 (1898) 194. — *Peucedanum gypsaceum* Korov. in Bot. mat. gerb. Glavn. Bot. Sada, V (1924) 75. —

P. severtzovii Korov. in *Izv. Sredneaz. univers. XIV, Dopoln.* (1926) 13. — Exs.: *H. F. A. M.* No. 245.

Perennial; root 0.5–1.5 cm thick, its neck densely covered with remnants of leaves; entire plant glabrous; stem 15–40 cm high, single, erect, branching with oblique antrorse branches from base often overtopping main stem; radical leaves many, crowded at base of stem, their short petioles expanding to oblong white-rimmed sheath, 7–10 cm long, 0.7–2 cm wide, tripinnatisect into narrow linear or subulate 2–3.5 mm long lobules, with white cartilaginous mucro; cauline leaves few, very small, less dissected, sessile on short, white, scarious sheath. Terminal umbel larger than others, of 11–23 glabrous rays; lateral umbels of 7–12 rays; involucre and involucels of 7–9 ovate-lanceolate or narrow lanceolate, acuminate, more or less erect, nearly entirely scarious leaflets; fruit ovoid, 5 mm long, 2–2.5 mm wide, with filiform dorsal ribs and narrowly winged margin; styles longer than stylopodium, recurved. April–May. (Plate I, Figure 1.)

Stony, gypsiferous and granite slopes, conglomerates in clayey steppes. — Centr. Asia: T. Sh. Endemic. Described from Mogol-Tau Range. Type in Leningrad.

Genus 1067. **PASTINACA*** L.

L. Sp. pl. (1753) 262

Calyx-teeth inconspicuous; petals yellow or orange, rounded-ovate, entire, with inward curved lobule; fruit lentiform-flattened dorsally, broadly ovoid, glabrous or pubescent; stylopodium pulviniform; mericarps with filiform dorsal ribs and broad, flat, hardly thickened margins; canals solitary under valliculae, almost reaching base of mericarps; carpophore bipartite; albumen flat toward commissure. Biennial or perennial, more or less pubescent, rarely subglabrous herbs, with simple or bipinnate leaves.

To 15 species in Europe and Asia.

- | | | | |
|-----|----|---|---------------------------------------|
| | 1. | Involucre and involucels lacking | 2. |
| 216 | + | Involucels always present, involucre sometimes lacking (Caucasus) . . | 4. |
| | 2. | Stem cylindrical, with thin ribs; main umbel of 5–10 rays; both surfaces of leaves hairy | 3. <i>P. umbrosa</i> Stev. |
| | + | Stem angular-ribbed; leaves glabrous above, sparingly pubescent beneath or subglabrous; main umbel of 9–20 rays | 3. |
| | 3. | Stem and leaves subglabrous below; root fleshy, sweetish, edible (cultivated plant) | 2. <i>P. sativa</i> L. |
| | + | Stem and leaves more or less hairy below; root woody, bitter | 1. <i>P. silvestris</i> Gars. |
| | 4. | Biennial, 50–90 cm high, main umbel usually of 10–18 rays | 4. <i>P. pimpinellifolia</i> M. B. |
| | + | Perennial, 20–60 cm high, main umbel with 5–10 rays | 5. |
| | 5. | Involucels of 5–11 leaflets, involucre often persistent (W. Transc.) | 6. <i>P. aurantiaca</i> (Alb.) Kolak. |
| | + | Involucels of 1–3 leaflets, involucre often lacking or of 1–2 leaflets | 5. <i>P. armena</i> Fisch. et Mey. |

* From the Latin *pastus* — fodder, food, referring to the edible root; or from *pastinus* — cultivated soil.

Section 1. EUPASTINACA Boiss. Fl. or. II (1872) 1060. — Involucre and involucels lacking; petals always glabrous.

1. *P. silvestris* Garsault, Descr. Pl. Anim. (1767) 263; Mill. Gard. Dict. ed. VIII (1768) No. 1. — *P. pratensis* Mart. Prodr. Fl. Mosq. ed. 2 (1817) 55. — *P. sativa* Ldb. Fl. Ross. II, 317, ex p. — *P. sativa* var. *arvensis* Dum. Fl. belg. (1827) 83. — *P. sativa* var. *silvestris* Kryl. et Schischk., Fl. Zap. Sib. VIII (1935) 1998. — *Elaphoboscum sativum* α. *silvestre* Rupr. Fl. ingr. (1860) 462. — *P. sativa* β. *pubescens* Kaufm., Moskovsk. Fl. (1889) 213. — *Peucedanum pastinaca* var. *opacum* Schmalh., Fl. sr. iyuzhn. Ross. I (1895) 411, ex parte. — Ic.: Hill, Herb. Brit. I, tab. 89. — Exs.: G. R. F. No. 1876.

Biennial; root fusiform, woody; stem 40–120 cm high, erect, short-haired, angularly and acutely ribbed, branching in upper half; leaves simple-pinnate, short-haired beneath mainly along nerves, sometimes also above, their 5–10 cm long petioles abruptly expanding to sheath, blade oblong, 5–20 cm long; leaflets ovate or oblong-ovate, short-acuminate or obtuse, 2–5 cm long, 1–3 cm wide, toothed, entire or shallowly cut into 1–2 lobes, terminal 3-lobuled. Umbels solitary at tip of stem and branches, 4–8 cm across, of 8–15(20) slightly unequal rays hairy above, or all umbels fertile or lateral umbels staminate; involucre and involucels lacking; calyx-teeth inconspicuous; petals yellow, rounded, ca. 1.5 mm long and as wide, not notched, with obtuse curved tip; fruit yellowish brown, plano-compressed, rounded-elliptic, 5–6 mm long, 4–5 mm wide; canals solitary in furrows, 2 toward commissure. June–July.

Exposed slopes, pastures, roadsides, ploughed fields. — European part: everywhere; W. Siberia: everywhere; E. Siberia: Yenis.; Caucasus: Cisc., Dag., E. and W. Transc. Gen. distr.: Scand. (S.), Centr. and Atl. Eur., Med., Ba.; introduced in N. and S. Am., Australia and New Zealand. Described from Europe. Type in London.

2. *P. sativa* L. Sp. pl. (1753) 262; DC. Prodr. 188; Ldb. Fl. Ross. II, 317; Grossg., Fl. Kavk. III, 184. — *P. lutea* Gilib. Fl. lithuan. II (1782) 39. — *P. vulgaris* Bubani, Fl. Pyren. II (1900) 393. — *P. insularis* Rouy et Camus, Fl. Franc. VII (1901) 374. — *P. sativa* var. *typica* Kryl. et Schischk. in Kryl., Fl. Zap. Sib. VIII (1935) 1998. — *Selinum pastinaca* Crantz, Stirp. Austr. ed. 1, III (1767) 21. — *Anethum pastinaca* Wibel, Fl. Werth. (1794) 146. — *Peucedanum sativum* Benth. et Hook. f. Gen. I (1862–1867) 920. — *P. pastinaca* Baill. Hist. Pl. VII (1880) 96, 188. — *P. pastinaca* α. *sativum* Schmalh. Fl. sr. iyuzhn. Ross. I (1895) 411. — *Elaphoboscum sativum* α. *typicum* Rupr. Fl. ingr. (1860) 462. — Ic.: Rchb. Ic. Fl. Germ. tab. 141.

Biennial; similar to preceding species but with thick and sweet root; stem 1–2 m high; leaves usually glabrous on both surfaces. Known only in cultivation.

Economic importance. Parsnips are known to have been cultivated as far back as the Middle Ages. Before the introduction of potatoes to Europe they represented an important food item. Their fleshy roots contain 1.55% nitrous substances, 0.41% fatty substances, and 12.34% carbohydrates. At present, *Pastinaca* is cultivated for use in soups, bouillons, and in mixed vegetable dishes.



PLATE XX. 1 — *Pastinaca armena* Fisch. et Mey.; 2 — *P. umbrosa* Stev.

3. *P. umbrosa* Stev. ex DC. Prodr. IV (1830) 189; Ldb. Fl. Ross. II, 318. — *P. teretiuscula* Boiss. Fl. or. II (1872) 1060; Grossg., Fl. Kavk. III, 184. — *P. latifolia* Ldb. Fl. Ross. II, 318, non DC. nec alior. — *P. opaca* var. *teretiuscula* Celak. in Oesterr. bot. Zeitschr. XXVII (1877) 128. — ? *P. panacifolia* Fisch. ex Sweet. Hort. Brit. ed. II (1830) 251, nom. — Exs.: G. R. F. No. 1726; Herb. Fl. cauc. No. 577.

Perennial; stem 80–120 cm high, rounded, ca. 1 cm thick, hollow, furrowed, branching; leaves pinnate, ovate, 20–30 cm long, 10–15 cm wide, short-sca-
brous along nerves above, with short dense, scabrous hairs beneath; leaflets
large, ovate or broadly ovate, 6–10 cm long, 3–6.5 cm wide, crenate-dentate,
sometimes incised, upper often 3-lobed. Umbels 3–8 cm across, the 4–7 rays
218 hairy especially above; involucre and involucels lacking; umbellets 0.7–1 cm
across; fruit broadly ovoid, 6 mm long, 5 mm wide, glabrous, dorsal ribs
filiform, marginal expanded. July–August. (Plate XX, Figure 2.)

Shrubs, forest edges, fallow fields. — European part: Crim.; Caucasus:
Dag., W., E. and S. Transc., Tal. Gen. distr.: As. Min., Arm.-Kurd.
Described from the Crimea. Cotype in Leningrad.

Note. According to Boissier, Steven rejected his Crimean species
described in Prodromus DC., but we consider the Crimean plant identical
with the species later established by Boissier (*P. teretiuscula* Boiss.)
and therefore retain Steven's name, following the rules of nomenclature.

4. *P. pimpinellifolia* M. B. Fl. taur.-cauc. I (1808) 237; DC. Prodr.
IV, 190; Ldb. Fl. Ross. II, 319. — *P. intermedia* Fisch. et Mey ex
Boiss. Fl. or. II (1872) 1061; Grossg., Fl. Kavk. III, 184. — *Heracleum*
pimpinellifolium Spreng. Umbell. Prodr. (1813) 12. — *Malabaila*
pimpinellifolia Hoffm. Umbell. ed. 2 (1816) 126; Boiss. Fl. or. II,
1056; Grossg., Fl. Kavk. III, 193. — *Peucedanum pimpinellifolium*
Schmalh., Fl. sr. iyuzhn. Ross. I (1895) 411. — *P. intermedium*
Schmalh. (1895) l. c. — Ic.: Hoffm. l. c. tab. I B, f. 6a, b.

Perennial; root rather thick, vertical; stem 50–90 cm high, erect, ribbed,
more or less stiff haired, branching, rarely simple; leaves ovate-oblong
or ovate-triangular, their petioles as long as blade, blade 15–20 cm long,
8–10 cm wide, bipinnatisect, primary and secondary lobes sessile, oblong,
secondary lobes toothed or pinnatifid, blade with short stiff hairs along
midrib and mainly along nerves above and beneath; upper leaves smaller,
less dissected, sessile on oblong sheath. Umbels 8–12 cm across, of
11–17 prickly-scabrous or subglabrous rays; lateral umbels much smaller;
involucre lacking or of 1–3 hairy leaflets; umbellets ca. 10 mm across;
involucels of 3–5 linear-lanceolate, thinly acuminate, ultimately recurved
leaflets; fruit broadly ovoid, 3–4 mm long, 2.5–3 mm wide, with 3 protruding
dorsal and expanded lateral ribs, with sparse short stiff hairs outside or
glabrous; canals 2 toward commissure, not converging and not reaching
 $\frac{2}{3}$ length of mericarp. Fl. May–June, Fr. July–August.

Shrubs and meadow slopes. — Caucasus: Cisc., E. (near Tbilisi) and
W. Transc. (Novorossiisk district). Endemic. Described from Terek
River and Georgievsk. Type in Leningrad.

221 5. *P. armena* Fisch. et Mey. in Hohenacker, Enum. Elisabethpol. (1833)
225; Ldb. Fl. Ross. II, 319; Boiss. Fl. or. II, 1061; Grossg., Fl. Kavk. III,

184. — *P. pimpinellifolia* var. *alpina* M.B. Fl. taur.-cauc. I (1808)
237. — Exs.: G.R.F. No. 2622; Pl. orient. exsic. No. 343.

Perennial; root vertical or ascending; stem 20–60 cm high, erect, angularly ribbed, slightly branching, with sparse soft hairs; petioles of lower cauline and radical leaves much shorter than blade, blade 5–7 cm long, 2–3 cm wide, pinnate, with ovate, broadly ovate or oblong lobes, shallowly cut or acutely toothed primary lobes, covered with sparse short stiff hairs; upper leaves smaller, less dissected, sessile on expanded sheath. Umbels 2–4(5) cm across, of 2–6 scabrous-hairy, unequal rays; common involucre lacking or of 1 reflexed leaflet; umbellets ca. 1.5 cm across; involucels of 1–3 linear-lanceolate acuminate leaflets; fruit glabrous or slightly pubescent, broadly ovoid, 5 mm long, 4 mm wide, with 3 filiform dorsal and winglike broadening lateral ribs; canals in vallecule narrow, nearly reaching base of fruit, 2 canals toward commissure, almost reaching base of fruit. July–August. (Plate XX, Figure 1.)

Subalpine and alpine meadows, mountain forest glades, to 3,000 m. — Caucasus: Cisc., Dag., W., E. and S. Transc. Gen. distr.: As. Min. (Pontus Range), Arm.-Kurd. Described from Saraiol Mountain and Shusha fortress. Type in Leningrad.

Economic importance. The fruits contain from 0.16 to 0.25% of an oil smelling like octyl alcohol.

6. *P. aurantiaca* (Alb.) Kolak., Fl. Abkhazia, III (1948) 243. — *Mala-baila aurantiaca* Alb. in Tr. Tifl. Bot. Sada, I (1895) 117; Grossg., Fl. Kavk. III, 192. — *M. chrysantha* Alb. l.c. (1895) 117; Grossg., Fl. Kavk. III, 192. — *P. chrysantha* K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX (1915) 212.

222 Perennial; multicaulescent plant; stem 15–25 cm high, like petioles and lower part of sheaths covered with fine spreading white hairs, furrowed, branching; radical leaves long-petioled, ovate, bipinnatisect, primary lobes ovate, dissected into broad linear, short lobules with short mucro; lower cauline leaves oblong, primary lobes larger than in radical leaves, dissected into linear-oblong, short-acuminate, often pinnatifid, dentate lobules; upper leaves with slightly developed blade reduced almost to sheath. Umbels of 5–6 rays covered with short dense bristles; involucre lacking or of 1–2 setaceous caducous leaflets lanceolate at base; umbellet rays densely bristly; involucels of many setaceous leaflets; petals bright golden; fruit ovoid-globular, covered with sparse bristly hairs and with narrow, thickened margin; canals narrow, solitary under vallecule and 2 nearly parallel, not divergent canals toward commissure. July–August.

Alpine meadows. — Caucasus: Main Range (W.), W. Transc. Endemic. Described from Kyttsykhr Range, Khag Mountain and sources of the Mzymta River. Type in Geneva.

Note. The description of *Pastinaca involucrata* C. Koch from Transcaucasia (in Linnaea, XVI (1842) 359; K.-Pol. in Bull. Soc. Nat. Mosc. N. S. XXIX, 112), which agrees with Boissier's report (Fl. or. II, 1062 in obs.), refers to fruits of *Heracleum* and leaves of *Opopanax*. It should be excluded from the Flora of the USSR as nonexistent.

Calyx-teeth indistinct; petals white or purple, notched, contracting with inward curved limb. Mericarps not separating, dorsally compressed, nearly flat, circular, truncate above, rounded below; ribs slightly protruding, sub-filiform, 3 dorsal ribs slightly approximate; oil tubes indistinct, inside ribs. Hypendocarp developed but not extending to rib; endocarp uninterrupted, surrounded by adnate pericarp of both fruitlets. Small, acaulescent perennials, with thick root and rosette of radical leaves, umbels and some umbellets with flowers; involucre and involucels lacking.

Note. A single species endemic to the upper reaches of the Main Range of the Caucasus. Its taxonomic position is vague. Boissier has compared it with a species of *Pastinaca*, section *Porphyrantha* Boiss. Kozo-Polyanskii included it in the tribe Azolleae, subfamily Hydrocotyloideae, almost indistinguishable from the South American *Azolla*. He subsequently claimed for its characters distinguishing it from *Pastinaca*, with which some 223 authors wanted to unite it (Koso-Poljansky, *Sciadophyt. System. Lineamenta, Mantissa, I*, p. 277 in Bull. Soc. Nat. Mosc. 1917). In his revision of the subfamily Hydrocotyloideae (Notulae Syst. ex Herb. Petrop. vol. V), *Symphyoloma* is definitely included in this subfamily.

1. *S. graveolens* C. A. M. Verz. Pflanz. Cauc. (1831) 127; Ldb. Fl. Ross. II, 320; Boiss. Fl. or. II, 1063; Grossg., Fl. Kavk. III, 185. — *Syncarpaea alpina* C. A. M. in herb. — Ic.: K.-Pol. *Sciadophyt. Syst. Lineamenta, Mantissa, I*, p. 277.

Perennial; plant 5–15(25) cm high; root thickened, 15–25 cm long, to 18(20) mm thick in upper part, with sweet carrot-like taste (according to collector's label); entire plant covered with fine hairs; stem not developed; leaves radical, 5–9 cm long, pinnatisect, their lobes 1–2-paired, lower lobes ovate, slightly discrete, terminal lobes much larger than lower, cordate at base, 15–30 mm long, 12–20 mm wide, sometimes only one terminal lobe developed; all lobes obtusely crenate. Umbels on 15–20 mm long peduncles, of 5–7 unequal rays; also produced from root neck are some umbellets on 15–25 cm long peduncles; involucre and involucels lacking; umbellets, subglobular, 8–12 mm across with numerous flowers; pedicels more densely hairy than rest of plant, twice as long as flowers; fruit 4–5 mm long, plano-urceolate, glabrous, ribs filiform, faintly protruding; carpophore lacking, stylopodium triangular-conical. July–August.

Rocky taluses, rarely high mountain meadows or pastures, in upper reaches of the Main Range in the Caucasus, from 2,700 to 4,000 m. — Caucasus; Cisc., W. and E. Transc. (Main Range only). Endemic. Described from shaly taluses in Tufan-Dagh Mountain. Type in Leningrad.

Economic importance. The roots have a sweetish rather agreeable taste and may be used as food.

* Treatment by I.P. Mandenova.

** From the Greek *symphyo* — I grow; *loma* — joint.



PLATE XXI. 1 — *Ormosciadium pulchrum* Schischk.; 2 — *Cymbocarpum wiedemannii* Boiss. — Schematic drawing of cross sections of mericarps; 3 — *Oedibasis apiculata* (Kar. et Kir.) K.-Pol.; 4 — *Oe. chaerophylloides* (Rgl. et Schmalh.) Korov.; 5 — *Oe. platycarpa* (Lipsky) K.-Pol.; 6 — *Korovinia tenuisecta* (Rgl. et Schmalh.) Nevski et Vved.

Genus 1069. **HERACLEUM** * L. **

L. Sp. pl. (1753) 249.—Sphondylium Mill. Dict. (1754); Hoffm. Umbell. (1814) 129.—
Wendia Hoffm. Umbell. (1814) 136.—Semenovia Rgl. et Herd. in Bull. Soc. Nat. Mosc. XXXIX,
3 (1866) 79.—Pastinaca sect. III Heracleum Calest in Webbia, I (1905) 243

Flowers in terminal umbel fertile, in lateral often sterile, calyx 5-toothed,
224 rarely obsolete, petals obovate, more or less deeply notched or 2-lobed,
white, rarely greenish yellow or bright pink, peripheral petals usually
markedly enlarged; fruit much flattened dorsally, oval, oboval to rounded or
elliptic, 3 dorsal ribs approximate, 2 narrowly filiform marginal ribs ad-
jacent to more or less swollen, winged borders of mericarp; canals solitary
in valliculae, sometimes with weakly developed accessory canals, usually
2 canals toward commissure, sometimes these not developed, toward basal
end canals more or less clavate, usually much shortened dorsally and at
commissure, rarely canals not expanded at base; endosperm enclosed in
dense envelope of mechanical tissue, interval between this and lateral ribs
thinner, transparent, of several layers of mechanical tissue; stylopodium
conical or semi-spherical in fruit, with undulant margin; carpophore bi-
partite. Monocarpic, biennial, rarely perennial herbs, with thickened root.

Up to 70 species in the northern temperate zone, particularly in the
mountains of Europe, Asia and America; in the south, from the Himalayas
and S. India to Ceylon; also reported from the mountainous parts of
Ethiopia in Africa.

Economic importance. Species of *Heracleum* (dyki — Georgian,
bokh — Armenian, boldyrgan — Azerbaidzhanian) are widely used by local
populations. Parts of the young plant are eaten fresh or marinated. The
leaves and fruits contain large quantities of essential oil. Available chemi-
cal analyses are not reported here because the determination of the species
usually arouses great doubt. Air-dried leaves contain about 1.25% essen-
tial oil, the fruits 0.23—1.75%. Some species have a strong skin-irritant
effect sometimes even causing severe burns. For accurate determination
ripe fruits are necessary.

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1. Canals septate for entire length, dorsal canals tapering toward
lower end, pointed (Section 4. *Apiifolia*) 2.
- + Canals not septate, dorsal canals more or less clavately expanding
toward base 5.
2. Leaves simple, shallowly lobed-incised; petals yellowish,
pubescent, hardly enlarging (Centr. Asia)
. 36. *H. olgae* Rgl. et Schmalh.
- + Leaves pinnate-compound, petals white 3.
3. Leaflets of involucre and involucels numerous, large; leaflets of
involucels about as long as flowering umbellets. Umbels of 4—8
rays, leaf segment usually deeply pinnatisect, sheaths markedly
enlarged 37. *H. transiliense* (Rgl. et Herd.) O. et B. Fedtsch.
- + Leaflets of involucre not developed, those of involucel small,
linear 4.
4. Calyx-teeth distinct; anthers olive-colored; fruit 9—10 mm long,
5—6 mm wide; canals $\frac{3}{4}$ length of commissure (Crim.)
. 35. *H. ligusticifolium* M. B.

* Treatment by I. P. Mandenova.

** Name derived from Pliny, after Hercules.

- + Calyx-teeth indistinct; anthers purple; fruit smaller, 5–7 mm long, 4–5 mm wide; canals $\frac{1}{3}$ or $\frac{1}{2}$ length of commissure (Caucasus) 34. *H. apiifolium* Boiss.
5. Dorsal canals proximally narrow, with abrupt large sacciform expansion, commissural canals broad, clavate; leaves ternate or pinnate-compound (Section 2. Pubescentia) 6.
- + Dorsal canals broad or narrow, gradually slightly expanded at lower end; leaves simple, ternate or pinnate-compound 13.
6. Umbels of 12–20 rays 7.
- + Umbels of 40–60 rays 8.
7. Leaves glabrous on both surfaces, peripheral petals slightly enlarged (Caucasus) 20. *H. sommieri* Manden.
- + Leaves short-haired beneath, peripheral petals markedly enlarged (Crimea) 15. *H. pubescens* M. B.
8. Leaves usually ternate, rarely pinnate-compound; disk finely tuberculate in flower, rugose-tuberculate in fruit 9.
- + Leaves usually pinnate-compound, rarely ternate; disk smooth in flower, longitudinally rugose in fruit 12.
9. Plant subglabrous or slightly hairy; rays of umbels and umbellets covered with soft spreading hairs or glabrous 10.
- 228 + Plant more or less densely hairy; rays of umbels and umbellets finely scabrous-hairy 11.
10. Fruit ellipsoid, 10–11 mm long, 5–6 mm wide, at most slightly tapering to base 16. *H. mantegazzianum* Somm. et Lev.
- + Fruit oblong-obovoid, 12–14 mm long, 5–6 mm wide, strongly cuneate at base 17. *H. grossheimii* Manden.
11. Leaf segments rather shallowly cut into 3 or 5 lobes 19. *H. sosnowskyi* Manden.
- + Leaf segments pinnatifid into lanceolate, strongly attenuate acuminate lobes 18. *H. wilhelmsii* Fisch. et Lall.
12. Fruit oblong or ovoid-oblong, with diffuse long thin hairs (Centr. Asia) 22. *H. lehmannianum* Bge.
- + Fruit obovoid or broadly obovoid, with dense long scarious hairs dorsally, with fine, spinose hairs along winglike border (*S. Transc.*) 21. *H. trachyloma* Fisch. et Mey.
13. Dorsal canals broad, sometimes entirely occupying valleculae 14.
- + Dorsal canals narrow, commissural canals usually slightly broader (Section 1. Euheracleum) 24.
14. Leaves usually simple, rarely ternate or pinnate-compound; dorsal canals $\frac{3}{4}$, rarely $\frac{1}{2}$ length of mericarp; commissural canals distinct, narrow or broad (Section 3. Villosa) 15.
- + Leaves pinnate-compound; dorsal canals usually not exceeding $\frac{1}{2}$ length of mericarp, commissural canals not developed (Section 4. Wendia) 19.
15. Leaves ternate or pinnate-compound, with 2 pairs of lateral segments, dense, with hairy largely toothed margin, hairy along nerves beneath, elsewhere glabrous; sheaths of cauline leaves oblong. Umbels of 8–12(20) rays 23. *H. scabrum* Alb.

- + Leaves usually finely pubescent, rarely glabrous above, more or less densely hairy to white-tomentose beneath; sheaths of cauline leaves markedly expanding, sometimes with toothed margin. Umbels many-rayed (30–40(60)) 16.
16. Plants 20–40(60) cm high; leaves simple, rarely ternate or pinnate-compound, peripheral petals very much enlarged, to 10 mm long 27. *H. grandiflorum* Stev.
- 229 + Plants larger, to 1 m high; leaves always simple; peripheral petals not strongly enlarged. 17.
17. Fruit large, 13–15 mm long, 10–13 mm wide, broadly obovoid to subglobular; dorsal canals reach $\frac{2}{3}$ length of mericarp, commissural canals narrow, filiform, usually $\frac{1}{3}$ length of mericarp 26. *H. antasiaticum* Manden.
- + Fruit smaller, 7–10(13) mm long, 6–9 mm wide; commissural canals broad (nearly as broad as the dorsal), usually longer, $\frac{1}{2}$ length of mericarp or slightly more 18.
18. Fruit oval, ovoid or obovoid; dorsal canals very broad, filling up valliculae 24. *H. stevenii* Manden.
- + Fruit usually subglobular, rarely ovoid or obovoid; dorsal canals usually narrower than valliculae 25. *H. leskovii* Grossh.
19. Stems in lower part densely covered with long bristles and appressed, retrorse hairs 29. *H. chorodanum* (Hoffm.) DC.
- + Stems in lower part glabrous or with short spreading hairs 20.
20. Stems with thin furrows; sheaths of cauline leaves slightly expanding; peripheral petals hardly enlarged 28. *H. pastinacifolium* C. Koch.
- + Stems deeply furrowed-ribbed; sheaths of cauline leaves much expanding; peripheral petals usually much enlarged 21.
21. High plants, 60–100 cm; umbels large, of 15–20 rays 30. *H. transcaucasicum* Manden.
- + Plants lower, 10–25(40) cm; umbels of 3–8(12) rays 22.
22. Flowers bright pink; umbels of (5)6–12 rays. Plants of Greater Caucasus 31. *H. roseum* Stev.
- + Flowers white; umbels of 3–5(10) rays. Plants of Lesser Caucasus 23.
23. Rhizome multicipital; involucels of 5–6 unpaired leaflets; dorsal canals slightly narrower than valliculae 32. *H. schelkovnikovii* Woron.
- + Rhizome not as above; involucels of 2–3 leaflets; dorsal canals broad, filling valliculae 33. *H. albiovii* Manden.
24. Rhizome multicipital, bearing sterile rosettes; leaves crowded at base of stem; peripheral petals almost not enlarged; dorsal canals $\frac{1}{2}$, commissural to $\frac{1}{3}$ length of mericarp, sometimes inconspicuous 14. *H. osseticum* Manden.
- 230 + Plant different 25.
25. Flowers greenish yellow; peripheral petals hardly enlarged, slightly notched 1. *H. sibiricum* L.
- + Flowers white or pink; peripheral petals enlarged, more or less deeply notched or 2-lobed 26.
26. Leaves simple 27.
- + Leaves ternate or pinnate-compound 30.

27. Plants 20—50 cm high; leaves shallowly lobed-incised; flowers bright pink 5. *H. carpaticum* Porcius.
 + Plants much higher, 60—160 cm high; leaves deeply pinnatifid or palmatifid 28.
28. Plants covered with soft, thin, gossamer hairs. 4. *H. palmatum* Baumg.
 + Plants more or less densely covered with short spreading hairs or glabrous 29.
29. Leaves sometimes palmatisect to base into broadly obovate lobes with cuneate base, or into subrhombic, more or less deeply pinnatifid lobes 3. *H. aconitifolium* Woron.
 + Leaves more or less deeply pinnatifid with oblong or ovate shallowly pinnatifid lobes 2. *H. cyclocarpum* C. Koch.
30. Leaves ternate, rarely pinnate-compound, except in uppermost leaves, segments shallowly pinnatifid 31.
 + Leaves pinnate-compound, with 2—3 pairs of lateral segments, rarely lowermost leaves ternate, their segments deeply pinnatisect, sometimes nearly to axis, into oblong or lanceolate lobes . . . 36.
31. Plants glabrous or sparingly pubescent; dorsal canals usually $\frac{1}{2}$ length of fruit 32.
 + Plants more or less densely pubescent; dorsal canals longer, usually $\frac{2}{3}$ length of fruit 34.
32. Leaves scabrous, covered with fine spinose hairs along large-toothed margin beneath, nerves markedly protruding, sparsely covered with scarious hairs; lateral segments short-petioluled 8. *H. sphondylium* L.
 + Leaves covered with thin short hairs, mainly along nerves, or glabrous; segments long-petioluled 33.
33. Involucels at flowering with large lanceolate-linear leaflets as long as or longer than umbellets (Kamchatka) 7. *H. dulce* Fisch.
 231 + Involucels with linear leaflets much shorter than umbellets (Caucasus) 6. *H. ponticum* (Lipsky) Schischk.
34. All rays covered with fine scarious hairs 9. *H. asperum* M. B.
 + All rays with soft spreading hairs 35.
35. Leaf segments ovate-oblong, deeply and sinuately pinnatifid into oblong, entire serrate lobes 11. *H. barbatum* Ldb.
 + Leaf segments broadly ovate, more or less deeply and sinuately pinnatifid into ovate-oblong, shallowly pinnatifid lobes 10. *H. dissectum* Ldb.
36. Plants glabrous or sparingly pubescent; leaf segments pinnatisect into oblong-lanceolate, shallowly pinnatifid lobes; fruit oblong-obovoid; dorsal canals not exceeding $\frac{1}{2}$, commissural $\frac{1}{3}$ or $\frac{1}{2}$ length of mericarp 13. *H. calcareum* N. Alb.
 + Plants more or less densely pubescent; leaf segments pinnatifid into broader, lanceolate, irregularly large-toothed lobes. Dorsal canals $\frac{3}{4}$, commissural to $\frac{1}{2}$ length of mericarp 12. *H. colchicum* Lipsky.

Section 1. EUHERACLEUM DC. Prodr. IV (1830) 191, ex parte, Manden. emend. Kavk. vidy r. Heracl. (1950) 24; W. D. J. Koch, Synops. Fl.

Germ. 2 Aufl. I (1846) 358; Boiss. Fl. or. II (1872) 1039, ex p. — Flowers white, greenish yellow or pink; dorsal canals narrow with gradual slight clavate expansion at lower end, usually to $\frac{2}{3}$, commissural broader, usually to $\frac{1}{2}$ length of mericarp.

Series 1. *Sibirica* Manden. — Flowers greenish yellow, peripheral petals hardly enlarged, slightly notched.

1. *H. sibiricum* L. Sp. pl. (1753) 249. — *H. flavescens* Bess. Fl. Gal. (1809) 210. — *H. arcticum* Rupr. Symb. ad Hist. et Geogr. plant. Ross. (1846) 37. — *Pastinaca sibirica* Calest. in Webbia, I (1905) 244.

Biennial or perennial; plant 60–100 cm high; stem ribbed, in lower part more or less densely covered with bristly hairs, in upper part hairs finer, softer; leaves ternate or pinnate-compound of 2–3 pairs of short-petioluled, 232 lateral segments, broadly ovate, sometimes deeply pinnatifid into narrow, sublinear lobes (var. *angustifolium* C. Koch), leaves finely scabrous-hairy above; all rays covered with short spreading hairs; involucre lacking, leaflets of involucre small, linear-subulate; flowers greenish yellow, peripheral petals hardly enlarged, slightly notched; fruit obovoid, 7–8 mm long, 5–6 mm wide, glabrous; dorsal canals $\frac{3}{4}$ length of fruit, commissural broader, $\frac{1}{2}$ length of fruit or slightly longer; stylopodium conical; styles as long as disk or slightly longer. July–August.

Shrubby thickets, moist meadows, riverbanks. — Arctic: Arc. Eur.; European part: everywhere; Caudasus: Cisc.; W. Siberia: Ob, U. Tob., Irt. Gen. distr.: Scand., Centr. Eur. (eastern part). Described from Siberia. Type in London.

Note. *H. sibiricum* L. varies markedly throughout its large distribution area. In the northern and particularly in the northwestern parts of the area there predominates a form with strongly dissected leaf segments, which some authors have separated as *H. flavescens*. Owing to the absence of geographic isolation, we have not done so. More field studies are necessary.

Economic importance. According to Grossgeim, the leaves contain 12.5–11.8 mg% carotene. Rollov reports that the rhizome contains much sugar, used in the distillation of spirits.

Series 2. *Sphondylia* Manden. — Flowers white, sometimes pink; peripheral petals usually much enlarged, more or less deeply 2-lobed.

2. *H. cyclocarpum* C. Koch in Linnaea, XVI (1842) 361; Boiss. Fl. or. II, 1041. — *H. palmatifidum* Fisch. et Lalle. in Index sem. Hort. Petrop. IX (1843) 73. — *H. palmatum* Akinf., Fl. Tsent. Kavk. (1894) 204, non Baumg. — *H. palmatum* var. *palmatisectum* Akinf. l. c. — *H. pollinianum* Grossh. Fl. Kavk. III (1932) 186, p. p. non Bertol. — *H. abchasicum* Leskov in Herb. p. p.

Biennial or perennial; plant 100–150 cm high; stem cylindrical, densely furrowed, very finely pubescent or glabrous; leaves simple, mostly crowded at base of stem, the lower with long, red-spotted, scarious-hairy petioles,

and subrounded blade, deeply pinnatilobate with oblong or ovate, shallowly pinnatifid lobes, rarely blade dissected into segments to midrib, and then leaf apparently ternate, with 1 pair of sessile lateral segments and usually decurrent terminal segment broadly ovate, with cuneate base; cauline leaves (1-2) with oblong, slightly expanding sheath and reduced blade, bright green
 233 above, covered with small papilliform hairs, paler, gray-green, more densely covered with small spreading hairs or glabrous (var. *glabrescens* Boiss.) beneath. Umbels numerous, terminal of 25-30 rays, lateral smaller, mostly sterile, all rays very finely pubescent; involucre indistinct, leaflets of involucre few, linear-subulate, unequal; flowers white, ovary with sparse dotted papilliform hairs; calyx inconspicuous; peripheral petals slightly enlarged, 5-6 mm long, deeply 2-lobed; anthers olive-colored; fruit broadly obovoid, deeply emarginate, 8-9(11) mm long, 6-7(9) mm wide, shiny, glabrous, sometimes covered with fine dotted papilliform hairs; dorsal canals $\frac{3}{4}$ length of fruit, commissural slightly broader, nearly parallel, $\frac{1}{2}$ length of fruit; stylopodium broadly conical; styles as long as stylopodium. August-September.

Upper forest belt, edges of forests, glades, moist stony slopes in gorges. — Caucasus: W. Transc. (southern part), E., and S. Transc. (Meskhetia). Gen. distr.: Bal.-As. Min. (Lazistan). Described from Kartalinia, Georgia. Type was in Berlin.

Note. Var. *glabrescens* Boiss. — form with thin, glabrous leaves described by Boissier from Lazistan, near Khabakhor, is predominant in the western part of the distribution area, in Lazistan and Adzhar.

3. *H. aconitifolium* Woron. in Tr. Bot. inst. AN SSSR, ser. 1, I (1933) 220.

Biennial or perennial; plant 60-100 cm high; stem cylindrical, densely furrowed, covered with spreading fine hairs; lower leaves simple, long-petioled, leaf blade rounded or ovate-rounded, with cordate base, deeply palmatisect, sometimes to base, into large, broadly obovate or subrhombic segments with cuneate base, these more or less deeply pinnatifid, largely and acutely toothed; upper cauline leaves similar, short-petioled or sessile, segments more deeply pinnatifid, glabrous or with sparse, papilliform hairs above, finely pubescent beneath. Umbels of 15-20 rays, all rays finely pubescent; involucre lacking, leaflets of involucre few, linear; flowers white; calyx inconspicuous; peripheral petals not strongly enlarged, 2-lobed
 234 to middle, lobes divergent; fruit (unripe) obovoid, finely pubescent; stylopodium narrowly conical, styles long. July-September.

Subalpine meadows. — Caucasus: W. Transc. (northern part). Endemic. Described from Abkhazia (saddle between Anchkho and Lakorozitau). Type in Leningrad.

4. *H. palmatum* Baumg. Enum. stirp. Transsilv. I (1816) 215; Boiss. Fl. or. II, 1040, p.p. excl. *H. pollinianum* Bertol. in syn. — *Pastinaca palmata* Calest. in Webbia, I (1905) 245.

Biennial or perennial; plant 1-1.5 m high; stem thick, 15-20 mm across, deeply furrowed, with short soft pubescence; leaves simple, subrounded, cordate at base, palmatilobate, lobes pinnatifid, largely dentate-serrate, glabrous or very sparse-hairy above, with sparse thin gossamer hairs

beneath, lower leaves long-petioled, upper sessile, with strongly expanded sheath. Umbels large, many-rayed, all rays very finely pubescent; involucre lacking; leaflets of involucre many, linear-lanceolate, nearly as long as umbellets; flowers white; calyx-teeth small, triangular; peripheral petals enlarged, 2-lobed to middle; fruit broadly obovoid, 10 mm long, 8 mm wide; dorsal canals $\frac{1}{2}$ length of mericarp, lateral slightly shorter. July–August.

Upper forest belt, forest edges, glades. — European part: U. Dns. (Carpathians). Gen. distr.: Centr. Eur. Described from Transylvania.

5. *H. carpaticum* Porcius in Ann. Acad. Rom. ser. II, XIV (1893) 109. — *H. alpinum* Baumg. et auct. fl. Transs. non L. — *H. pollinianum* Nyman, Consp. fl. Eur. (1878–1882) p. p. non Bertol.

Biennial; plant 20–50 cm high; stem cylindrical, thinly furrowed, usually hollow in lower part, with more or less dense short hairs in upper part; leaves simple, subrounded, cordate at base, shallowly lobed-incised, largely crenate-serrate, glabrous above, with more or less dense short hairs beneath; lower leaves long-, upper short-petioled or sessile, usually with reduced 3-lobed blade and expanded sheath. Umbels of 8–15 thin rays with very short usually dense pubescence; leaflets of involucre lacking, leaflets of involucre few, linear, markedly unequal; flowers bright pink; ovary subglabrous; calyx not developed; peripheral petals slightly enlarged, 2-lobed to middle, lobes oblong; anthers olive-colored; fruit broadly obovoid, 235 glabrous or with sparse fine hairs; dorsal canals $\frac{3}{4}$ length of mericarps; stylopodium conical, styles twice as long. July–August.

Subalpine belt, in herbaceous habitats. — European part: U. Dns. (Carpathians). Gen. distr.: Centr. Eur. Described from the Carpathians.

6. *H. ponticum* (Lipsky) Schischk. ex Grossh., Fl. Kavk. III (1932) 185. — *H. cyclocarpum* C. Koch var. *ponticum* Lipsky in Tr. Bot. Sada, XIV (1895) 275. — *H. sphondylium* var. *caucasicum* S. et L. in Tr. Bot. Sada, XVI (1900) 192. — *H. abchasicum* Leskov in Herb. p. p.

Biennial or perennial; plant 1–1.5(2) m high; stem deeply furrowed, glabrous in lower part, with fine, spreading hairs in upper part; lower leaves long-petioled, ternate, lateral segments long-petioluled, 3–5 cm long, broadly ovate or subrounded, shallowly lobed-incised, terminal segment much larger than lateral, subrounded, usually wider than long, with cordate base, usually 3- rarely 5-lobed to middle, sometimes lobes shallowly incised, crenate-dentate, mucronate; cauline leaves similar, reduced, uppermost with oblong, hardly expanding sheath and entire, more or less deeply 3-lobed blade, glabrous above, rarely with sparse, fine, papilliform hairs, shiny, glabrous beneath rarely with very fine, short, spreading, ciliate hairs. Umbels of 20–30 rays; all rays slightly spreading-hairy; leaflets of involucre few, deciduous, of involucre linear, unequal; flowers white; ovary with fine, scabrous hairs; calyx inconspicuous; peripheral petals enlarged, 6–7 mm long, deeply 2-lobed; anthers olive-reddish or olive-colored; fruit broadly obovoid to subglobular, not deeply emarginate, 7–9 mm long, 6–7 mm wide, glabrous, shiny, sometimes with fine, dotted, papilliform hairs; dorsal canals usually to $\frac{1}{2}$ length of fruit, rarely extending slightly beyond middle; commissural canals broader, nearly parallel, extending to $\frac{1}{2}$ length of fruit. July–August.

Upper forest and subalpine belt, forest edges, subalpine meadows. — Caucasus: W. Transc. (region of Main Range, Caucasus). Endemic. Described from Abkhazia (Pslukh River, tributary of Mzymta). Type in Leningrad.

Note. Lipskii's description is based on an incomplete herbarium specimen of a stem apex with 1 upper cauline leaf and an umbel, which led Grossgeim in his Flora of the Caucasus to include *H. ponticum* in the groups with 236 simple leaves. Later A. Leskov proposed *H. abchasicum* Lesk. for this plant, but also included specimens of *H. cyclocarpum* C. Koch. Yet these species are easily distinguished by the shape of the leaves and their geographical distribution.

7. *H. dulce* Fisch. in Ind. sem. Hort. Petrop. (1843) 23; Kom., Fl. poluostrova Kamchatki (1929) 348.

Biennial or perennial; plant 150–200 cm high; stem thick, deeply furrowed, with sparse hairs mainly at nodes; leaves ternate, rarely pinnate-compound (2 pairs); petiolules of first pair of lateral segments 3–4 cm long, other segments sessile; all broadly ovate, ternately or pinnately cut into ovate, pointed, largely and irregularly toothed lobes, terminal segment subrounded, deeply lobed, lobes broadly ovate, pointed, sometimes slightly overlapping; leaves glabrous above, with fine hairs mainly along nerves beneath; upper leaves usually ternate, with expanded sheath. Umbels many-rayed, all rays with finely spreading hairs; involucre lacking; stem densely covered with long hairs under umbel; leaflets of involucels many, lanceolate-linear, very long, as long as or sometimes longer than flowering umbellets; flowers white; ovary spreading-hairy, calyx-teeth small, triangular; peripheral petals enlarged; fruit 6–8 mm long, 7–8 mm wide, glabrous or sparsely hairy; dorsal canals usually $\frac{1}{2}$ length of fruit, rarely slightly longer, commissural canals broader, $\frac{1}{2}$ length of fruit; stylopodium broadly conical; styles twice as long as stylopodium. July–August.

Subalpine meadows, forest edges, very frequent in riparian valleys. — Far East: Kamch. Endemic. Described after Mertens' specimens from Kamchatka. Type in Leningrad.

Economic importance. The stripped stem and petioles are eaten. In the past vodka was distilled from the stem. In Kamchadals it is called uchkui or inchkou, in Russian sladkaya trava (sweet grass).

8. *H. sphondylium* L. Sp. pl. (1753) 249; Szaf. Kulcz. Pavl. Rosl. Polskie, 447; Hegi, III. Fl. V, 2, 1427. — *Pastinaca sphondylium* Calest. in Webbia, I (1905) 244. — Ic.: Hegi, l. c. f. 2545.

237 Biennial or perennial; stem deeply furrowed, with more or less appressed hairs, sparse in lower part, more dense in upper; leaves usually ternate, lateral segments on petiolules, more or less deeply lobed-incised, leaves sparsely covered with appressed, scarious hairs above, scabrous beneath, large-toothed margin bears fine spinose hairs, prominent nerves not densely covered with scarious hairs, otherwise glabrous; petioles with scarious hairs; upper leaves with obsolete blade on short petiole or sessile; sheath expanded; blade sometimes very deeply cut into strongly elongated lobes. Umbels many-rayed, rays of umbels and umbellets very unequal; flowers white or slightly reddish; peripheral petals enlarged, deeply

2-lobed to $\frac{2}{3}$, lobes markedly divergent; anthers olive-colored; ovary with sparse short spreading hairs. July–September.

Meadows, forest edges, taluses in middle and upper mountain region. — European part: U. Dns. (Carpathians). Gen. distr.: N. and Centr. Eur. Described from Europe. Type in London.

9. *H. asperum* M. B. Fl. taur.-cauc. III (1819) 224; Boiss. Fl. or. (1872) 1046; Shmal'g., Fl. I, 113; Grossg., Fl. Kavk. III, 87. — *H. umbonatum* Boiss. Fl. or. II (1872) 1043. — *Sphondylium asperum* Hoffm. Umb. ed. 2, I (1814) 134. — ? *Pastinaca mazurewskyi* Kalen. in Bull. Soc. Nat. Mosc. XVIII (1845) 232.

Biennial or perennial; plant 1–1.5 m high; stem deeply furrowed, usually more or less scabrous-hairy; leaves ternate, rarely pinnate-compound, lateral segments subsessile, ovate or ovate-oblong, oblique, more or less deeply pinnatifid into ovate, pointed acutely toothed lobes; terminal segment subrounded, deeply lobed, lobes cut into ovate, pointed lobules; leaves glabrous above, with very fine, spreading hairs confined to midrib, more densely spreading-hairy beneath; cauline leaves smaller, on oblong, slightly developed sheath; uppermost leaves sometimes reduced to sheath. Umbels large, many-rayed, all rays finely scabrous-hairy; involucre usually deciduous, leaflets of involucels linear-setaceous, unequal, slightly expanding at base; flowers white; ovary finely scabrous-hairy; calyx-teeth inconspicuous; peripheral petals not strongly enlarged; anthers olive-colored; fruit 6–10 mm long, 5–6 mm wide, obovoid or ovoid, with very fine antrorse papilliform hairs; dorsal canals to $\frac{3}{4}$ length of fruit, commissural much broader, usually $\frac{1}{2}$ length of fruit or slightly longer; stylopodium conical, styles slightly longer than stylopodium. July–August.

Upper forest and subalpine belts, 1,800–2,500 m, forest edges, glades, 238 subalpine meadows. — Caucasus: Cisc., E. Transc. (southern slope of Main Range), Dag. Endemic. Described from Besh-Tau Mountain. Type in Leningrad.

Note. *H. asperum* was introduced in 1812, in Fisher's catalogue of the Gorenkovskii garden. In 1814 Hoffmann briefly described from that garden the fruit of *Heracleum* as *Sphondylium asperum*. However, as the origin of that plant is unknown, we prefer to regard the author of *H. asperum* as M. Bieberstein, who first fully described this species after Wilhelm's plants from Besh-Tau Mountain.

10. *H. dissectum* Ldb. Fl. alt. I (1829) 301; Ej. Fl. Ross. II, 323. — *H. panaces* Ldb. Fl. Ross. II (1844) 323, non l. — *H. dissectum* a. typicum Kryl., Fl. Alt. I (1908) 334; Kryl., Fl. Zap. Sib. VIII, 2000. — *Pastinaca dissecta* K.-Pol. in Bull. Soc. Nat. Mosc. XXXIX (1916) 113. — Ic.: Ldb. Fl. Ross. tab. 304. — Exs.: G. R. F. No. 2623.

Biennial or perennial; plant 1–1.5 m high; stem deeply furrowed, spreading-hairy; leaves ternate, seldom pinnate-compound of 2 pairs of lateral segments, first with short petiolules, second sessile, lateral segments broadly ovate, terminal rounded, all segments more or less deeply notched and pinnatifid into ovate-oblong, pointed pinnatifid lobes; leaves with small appressed hairs above, with more or less dense spreading hairs beneath. Umbels large, many-rayed; involucre lacking, leaflets of involucels linear-

lanceolate, unequal; all rays with soft spreading hairs; flowers white; peripheral petals enlarged, 2-lobed; ovary with soft spreading hairs; fruit obovoid, 8–9 mm long, 5–7 mm wide, glabrous or with sparse thin hairs; dorsal canals $\frac{2}{3}$ length of fruit, commissural canals broader, $\frac{1}{2}$ length of fruit; stylopodium conical, styles as long or twice as long as stylopodium. July–August.

Forest glades, edges, shady slopes. — W. Siberia: Ob, Irt., Alt.; E. Siberia: Lena-Kol., Ang.-Say., Dau.; Far East: Okh., Ze.-Bu., Uda, Uss., Sakh.; Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Dzu.-Kash., Mong. (Tannu-Ola). Described from Altai. Type in Leningrad.

Economic importance. Young shoots and leaves are eaten marinated, the stripped stems are eaten fresh. According to Reverdatto, the plant is readily eaten by sheep.

11. *H. barbatum* Ldb. Fl. alt. (1829) 300; Ej. Fl. Ross. II, 322. — *H. dissectum* β . *barbatum* Kryl., Fl. Alt. I (1908) 534; Kryl., Fl. Zap. Sib. VIII, 2000. — Ic.: Ldb. Ic. fl. Ross. tab. 303.

- 239 Biennial or perennial, to 1 m high; stem furrowed, with spreading hairs; leaves pinnate-compound with 2 pairs of lateral ovate-oblong segments deeply pinnatifid into oblong, entire, acuminate, serrate lobes; leaves with small, sparse, appressed hairs above, with more or less dense spreading hairs beneath. Umbels many-rayed, involucre lacking, leaflets of involuclers lanceolate-linear, unequal, all rays with soft, spreading hairs; flowers white; peripheral petals enlarged, 2-lobed; ovary pubescent; fruit obovoid or broadly ellipsoid, 8–9 mm long, 5–7 mm wide, glabrous or with remote, delicate hairs; dorsal canals $\frac{2}{3}$ length of fruit, commissural canals broader, $\frac{1}{2}$ length of fruit; stylopodium conical; styles usually twice as long as stylopodium. July–August.

Forest edges, glades. — W. Siberia: Irt., Alt. Endemic. Described from Altai. Type in Leningrad.

12. *H. colchicum* Lipsky in Tr. Bot. Sada, XIV, 2 (1898) 276; Grossg., Fl. Kavk., III, 187. — *H. sphondylium* var. *elegans* Akinf., Fl. Tsentr. Kavk. (1894) 204, non Thell. — *H. ponticum* var. *mingrelicum* Schischk. in sched. — *H. mingrelicum* Lesk. in sched. — ? *H. freynianum* Somm. et Lev. in Nuovo Giorn. bot. ital. (1895) 81; in Tr. Bot. Sada, XVI (1900) 196.

Biennial or perennial; root neck densely covered with remnants of sheaths; stem usually 80–100, very rarely 25–30 cm high, deeply furrowed; radical leaves with long petioles, pinnate-compound, usually of 2–3, rarely 1 pair of oblong-ovate segments, first petioluled, others sessile, their segments more or less deeply pinnatifid into lanceolate, acuminate, irregularly large-toothed lobules; cauline leaves similar, more deeply pinnatisect (sometimes to midrib) into narrower lobules, lower cauline leaves with shorter petioles, upper on expanded sheaths with fine remote hairs above, usually with dense soft silvery hairs, rarely with remote hairs beneath. Umbels of 12–15(20) rays, all rays with more or less dense spreading hairs, leaflets of involucre few, lanceolate, usually deciduous, leaflets of involuclers unequal, few, lanceolate-linear; flowers white or faintly yellowish; peripheral petals slightly enlarged; anthers olive-colored; ovary densely and finely pubescent; fruit obovoid or

240 obovoid-globular, 8–9 mm long, 6–7 mm wide, distinctly notched, with remote scabrous hairs, covered with very small, appressed, antrorse hairs; dorsal canals to $\frac{3}{4}$ length of fruit, commissural broader, slightly divergent, $\frac{1}{2}$ length of fruit; stylopodium broadly conical; styles as long as stylopodium or slightly longer.

Alpine belt, stony taluses, moraines. — Caucasus: W. Transc. (southern slopes of Main Range). Described after specimens from the sources of the Mzymta River, near Lake Kardabach. Type in Leningrad.

Note. A polymorphic species, varying in pubescence and size of leaf and in its degree of dissection. Plants from Svanetia and Megrelia usually differ somewhat from those of Abkhazia by the more elongate lobules and the more tapering fruits at the base. This form was first studied by B. K. Shishkin, followed by A. I. Leskov, who considered it a distinct species, *H. migrelicum* Lesk. In view of the above-mentioned variability there is no ground for an independent status. It fully agrees with *H. freynianum* Somm. et Lev., described from Svanetia. The only discrepancy is the broad dorsal canals which may be due to the observation by the authors of unripe fruits.

13. *H. calcareum* N. Alb. in Tr. Tifl. Bot. Sada, I (1895) 116; Grossg., Fl. Kavk. III, 188.

Perennial; taproot long, its neck densely covered with fragments of dead sheaths; stem 40–60 cm high, thin, deeply furrowed; radical leaves long-petioled, pinnate-compound, usually of 3 pairs of remote segments, first petioluled, others sessile, segments deeply pinnatisect to midrib into oblong-lanceolate, acuminate, obliquely antrorse decurrent, shallowly and remotely pinnatifid lobules; cauline leaves similar, lower with shorter petioles, upper on expanded sheath; all leaves usually glabrous, rarely with very sparse small hairs above and beneath. Umbels of 8–10 rays, all rays glabrous or with remote fine papilliform hairs, involucre lacking, leaflets of involu-
cels few, 1–3, lanceolate-linear; flowers white; peripheral petals slightly enlarged, obovate, shallowly 2-lobed; anthers yellow; ovary glabrous or like rays covered with fine papilliform hairs; fruit oblong-obovoid, 8–9 mm long, 5–6 mm wide, hardly notched, canals unequal, $\frac{1}{2}$ length of mericarp,
241 commissural canals slightly broader, short, $\frac{1}{4}$ or $\frac{1}{2}$ length of mericarp; stylopodium broadly conical; styles not longer than stylopodium. July–August.

Limestone taluses in alpine belt, 2,200–2,300 m. — Caucasus: W. Transc. (N. Abkhazia). Endemic. Described from Kutysh Mountain. Type in Geneva.

Note. In his diagnosis Albov mentions the total absence of hairs; later collections showed the plant to be sometimes more or less pubescent. It is very close to *H. colchicum* Lipsky, from which it differs by the deeper dissection of the leaf segments, longer fruits and much shorter canals.

14. *H. osseticum* Manden. in Zam. po sist. i geogr. r. Tbil. Bot. inst. 2 (1938) 9. — Ic.: l. c. 12, tab. 3.

Perennial; rhizome long, multicapital, bearing sterile rosettes of leaves; stem 20–50 cm high, thin, virgate, narrowly furrowed, glabrous; leaves

mainly crowded at base of stem, glabrous, pinnate-compound, long-petioled, ovate, of 2–3 pairs of largely toothed segments, first long-petioluled, broadly ovate, more or less deeply lobate-incised, sometimes ternate, second pair short-petioluled, third sessile, terminal segment 3-lobed; few cauline leaves reduced to expanded sheath with lanceolate, incised blade or to sheath only. Umbels of 4–10 rays, all rays with fine, papilliform hairs, involucre lacking or of 1 ovate or subrounded, usually deciduous leaflet, leaflets of involucels 1–3, small, ovate, also usually deciduous; flowers white; ovary glabrous; calyx-teeth inconspicuous; peripheral flowers in umbellets slightly enlarged, their peripheral petals to 5 mm long, 2-lobed for $\frac{1}{3}$ or $\frac{1}{2}$, lobes broad, slightly divergent; anthers olive-colored; fruit broadly obovoid, 8–10 mm long, 5–7 mm wide; dorsal canals extending to $\frac{1}{2}$ length of fruit, rarely slightly more, commissural canals $\frac{1}{3}$ length of fruit, sometimes hardly discernible; stylopodium broadly conical, with undulant margin; styles twice as long as stylopodium. August–September.

Alpine belt, 2,400–3,200 m, taluses. — Caucasus: E. Transc. (southern slope of central part of Main Range, Racha, Mamisonskii pass and S. Osetia). Endemic. Described from S. Osetia. Type in Tbilisi.

Section 2. PUBESCENTIA Manden. Kavk. vidy Heracl. (1950) 43. — Sect. Sphondylium DC. l. c. p. p. — Sphondylium Hoffm. (pro gen.) l. c. p. p. — Flowers white, canals narrow at back, then abruptly, sacciformly 242 broadening at lower end, reaching $\frac{2}{3}$ – $\frac{3}{4}$ the length of fruit.

Series 1. Pubescentia Manden. — Disk narrowly conical in fruit, with longitudinal wrinkles.

15. *H. pubescens* M. B. Fl. taur.-cauc. III (1819) 225, s. str. (excl. pl. cauc.). — *Pastinaca pubescens* Calest. in Webbia, I (1905) 246.

Biennial or perennial; plant 60–80 cm high; stem deeply furrowed, hairy; leaves ternate or pinnate-compound, of 2 pairs of lateral segments, first short-petioluled, second sessile, segments ovate, pinnatifid into oblong, acuminate, unequally serrate-dentate lobes; leaves glabrous above, finely pubescent beneath. Umbels small, 10–12 cm across, of 18–20 rays, all rays with soft spreading hairs; involucre usually lacking, involucels of few leaflets; flowers white; ovary with dense soft spreading hairs; calyx-teeth distinct; peripheral petals enlarged; fruit broadly obovoid, 13–14 mm long, 8–10 mm wide, glabrous or with thin hairs, sometimes with fine prickly hairs along margin; dorsal canals $\frac{3}{4}$ length of fruit, commissural to $\frac{1}{2}$; stylopodium narrow, conical; styles longer than stylopodium. July–August.

Moist, shady localities. — European part: Crim. (southern coast). Endemic. Described from near Nikita village. Type in Leningrad.

Series 2. Mantegazziana Manden. — Disk in flower finely tuberculate, in fruit broadly or narrowly conical, prominently tuberculate-rugose.

16. *H. mantegazzianum* Somm. et Lev. in Nuovo Giorn. bot. ital. Nuova ser. II, 2 (1895) 79; Tr. Bot. Sada, XVI (1900) 193; Grossg., Fl. Kavk. III, 189. — Ic.: Tr. Bot. Sada, XVI, Table, title.

Perennial; plant 2–2.5 (to 3) m high; stem furrowed-ribbed, sparsely hairy; leaves glabrous or remotely pubescent beneath; radical and lower cauline leaves usually ternate, lateral segments petioluled, oblong-ovate, pinnatifid into triangular-lanceolate lobules, usually markedly elongate, acuminate, terminal segment deeply pinnatisect into oblong, shallowly pinnatifid, usually much elongated acuminate lobules; upper leaves rather reduced, with strongly expanding sheath. Umbels very large, many-rayed, all rays spreading-hairy; leaflets of involucre and involucels linear-subulate; flowers white; ovary densely spreading-hairy; calyx-teeth distinct, triangular, green; peripheral petals much enlarged, deeply 2-lobed; anthers olive-colored; fruit ellipsoid, 10–11 mm long, 6–7 mm wide, hardly tapering at base, covered with few very remote marginal spines, dorsally glabrous or covered with sparse thin hairs; dorsal canals $\frac{3}{4}$, commissural to $\frac{1}{2}$ or nearly $\frac{1}{2}$ length of fruit; stylopodium conical, tuberculate-rugose; styles three times as long as stylopodium. July–August.

Upper forest belt, ravines, forest glades, forest edges, tall herbaceous cover. — Caucasus: Cisc., W. Transc. (N.). Endemic.

Economic importance. Widely cultivated ornamental of W. European parks and gardens.

17. *H. grossheimii* Manden. ex Grossh., Opred. rast. Kavk. (1949) 238; Manden., Kavk. vidy roda *Heracleum* (1950) 47.

Biennial or perennial; plant 1–1.5 m high; stem deeply furrowed-ribbed, densely spreading-hairy; leaves pale green, glabrous above, paler with fine remote hairs beneath; lower leaves ternate, rarely pinnate-compound, and then first pair of segments short-petioluled, second sessile; lateral segments ovate, pinnatifid into lanceolate, strongly acuminate lobules, terminal segment subrounded, deeply pinnatifid, lobes ovate-oblong, deeply pinnatifid into lanceolate, strongly acuminate lobules; upper leaves on much expanded, finely pubescent sheath, ternate or simple, deeply pinnatisect. Umbels large, many-rayed, all rays covered with spreading, pedunculate-glandular and thin, simple hairs; leaflets of involucre and involucels linear-subulate, unequal; flowers white; ovary densely spreading-hairy; calyx-teeth distinct, triangular, green; peripheral petals much enlarged, deeply 2-lobed; anthers purple; fruit oblong-obovoid, 12–14 mm long, 5–6 mm wide, cuneately tapering to base, subglabrous or with very remote, thin, long hairs, sometimes with few prickly hairs at base and at upper margin of fruit; dorsal canals of mericarp $\frac{2}{3}$, lateral and commissural short, sometimes $\frac{1}{2}$ length of fruit; stylopodium narrowly conical, tuberculate-rugose; styles 3–4 times as long as stylopodium. July–August.

Upper forest belt, glades, forest edges and paths. — Caucasus: W. Transc. (Guria, Imeretia). Endemic. Described from specimens collected by Grossgeim in Guria near Bakhmaro. Type in Tbilisi.

244 18. *H. wilhelmsii* Fisch. et Lallemand. in Index sem. Hort. Petrop. VII (1840) 51; Ldb. Fl. Ross. II, 325; Grossg., Fl. Kavk. III, 189. — *H. pubescens* var. *Wilhelmsii* Boiss. Fl. or. II (1872) 1044.

Perennial; plant 1–1.5(2) m high; stem deeply furrowed, ribbed, densely hairy; leaves glabrous above, densely and finely pubescent beneath; radical and lower cauline leaves ternate, rarely pinnate-compound, of 2 pairs of lateral segments, first short-petioluled, second sessile; segments ovate, oblique, pinnatifid into lanceolate, acuminate lobules, terminal segment subrounded, deeply pinnatifid into ovate-oblong, deeply pinnatifid lobes, with lanceolate, strongly acuminate lobules; upper leaves reduced, with strongly expanding sheath. Umbels large, to 40–50 cm across, many-rayed, all rays with fine scabrous pubescence, leaflets of involucre and involucels linear-subulate, unequal; flowers white; ovary densely hairy; calyx-teeth very distinct, triangular, green; peripheral petals much enlarged, 10–12 mm long, deeply 2-lobed; anthers dark purple; fruit obovoid, 10–13 mm long, 7–9 mm wide, with dense antrorse, curved, prickly, sometimes mixed with long scarious hairs, rarely prickly hairs confined to margin and base, dorsal surface with long, scarious, entangled hairs; dorsal canals $\frac{3}{4}$, commissural $\frac{1}{2}$ length of fruit, stylopodium conical, tuberculate-rugose; styles 2–3 times as long as stylopodium. July–August.

Upper forest and subalpine belt. — Caucasus; E. Transc. Endemic. Described after specimens grown from seeds obtained by Wilhelms from Georgia (near Bakuriani-Kodiani). Type in Leningrad.

19. *H. sosnowskyi* Manden. in Zam. po sist. i geogr. r. Tbil. Bot. Inst. 12 (1944) 17; Kavk. vidy r. *Heracleum*, 42. — *H. pubescens* auct. fl. cauc. p. p.

245 Biennial or perennial; stem 1–1.5 m high, cylindrical, deeply furrowed, sparingly pubescent; radical and lower cauline leaves ternate, sometimes pinnate-compound, of 2 pairs of lateral segments, first short-petioluled, second sessile; lateral segments broadly ovate or subrounded, oblique, rather shallowly, usually 3-, rarely 5-fid into broadly ovate lobes, terminal segment rounded, more or less deeply trifid into broadly ovate, slightly lobed-incised lobes; upper leaves reduced, with expanded sheath and usually with entire, trilobate blade; leaves glabrous above, with fine spreading hairs beneath. Umbels large, many-rayed, all rays finely scabrous-hairy, leaflets of involucre and involucels linear-subulate, with slightly expanded base; flowers white; ovary spreading-hairy; calyx-teeth distinct, triangular, green; peripheral petals enlarged; fruit obovoid, oblong or broadly ellipsoid, 10–12 mm long, 6–8 mm wide, with sparse long hairs on dorsal surface and few prickly hairs along margin and base; dorsal canals $\frac{3}{4}$, commissural $\frac{1}{2}$ length of fruit, broad; stylopodium semispherical, tuberculate-rugose; styles 2–3 times as long as stylopodium. July–August.

Middle and upper forest belt, forest edges, glades, etc. — Caucasus; W. Transc. (Adzharia), E. Transc., Dag. Endemic. Described from Georgia (Meskhetia-Adigen district, on the road to Lelovani yaila). Type in Tbilisi.

20. *H. sommieri* Manden. ex Grossh., Opred. rast. Kavk. (1949) 237; Manden., Kavk. vidy r. *Heracleum* (1950) 51. — *H. pubescens* var. *glabratum* Somm. et Lev. in Tr. Bot. Sada, XVI (1900) 192; Grossg., Fl. Kavk. III, 189.

Biennial, perennial; stem to 50 cm high, deeply furrowed-ribbed, subglabrous in lower part, with dense spreading hairs in upper part; radical and cauline leaves ternate, with short-petiолuled, ovate, oblique lateral segments, more or less deeply pinnatifid into ovate, acuminate lobules, terminal segment drawn back from lateral, broadly ovate or subrounded, more or less deeply pinnatifid into ovate-oblong, sometimes shallowly pinnatifid lobules; the few upper cauline leaves with expanded, slightly pubescent sheath and small, pinnatisect blade; all leaves glabrous at both surfaces, more or less regularly and largely crenate-dentate, with finely ciliate margin. Umbels of 12–14 rays, all rays densely spreading-hairy, leaflets of involucre subulate-elongate, with slightly expanded base, of involucels lanceolate, unequal; flowers white; ovary densely spreading-hairy; calyx-teeth very distinct; peripheral petals rather slightly enlarged, 2-lobed to middle; anthers olive-colored; fruit with sparse gossamer hairs; dorsal canals $\frac{3}{4}$, commissural $\frac{1}{2}$ length of fruit. July–August.

Subalpine meadows. — Caucasus: W. Transc. (Svanetia). Endemic. Described from Svanetia (Latal'). Type in Tbilisi.

246 Series 3. *Trachyloma* Manden. — Disk in fruit broadly conical or semi-spherical, with longitudinal wrinkles.

21. *H. trachyloma* Fisch. et Mey. in Ind. sem. Hort. Petrop. I (1834) 29; Ldb. Fl. Ross. II, 324; Grossg., Fl. Kavk. III, 189. — *H. pubescens* var. *trachyloma* Boiss. Fl. or. II (1872) 1044.

Biennial or perennial; stem 1–1.5 m high, deeply furrowed-ribbed, with dense spreading hairs; lower leaves pinnate-compound, of 2–3 pairs of lateral segments, first petioluled, others sessile, segments ovate or ovate-oblong, oblique, deeply pinnatifid into ovate or ovate-oblong, acuminate lobules, terminal segment subrounded, deeply cut into ovate-oblong, more or less deeply pinnatifid lobes with ovate acuminate lobules; upper leaves reduced, with expanded hairy sheath. Umbels large, many-rayed, all rays spreading-hairy, leaflets of involucre lanceolate, of involucels lanceolate-ovate, with ciliate-hairy margin; flowers white; ovary densely spreading-hairy; calyx-teeth distinct; peripheral petals enlarged; fruit 7–11 mm long, 5–7 mm wide, obovoid or globular-obovoid, dorsal surface densely covered with long scarious hairs, margin with fine, antrorse, prickly hairs; dorsal canals $\frac{3}{4}$, commissural $\frac{1}{2}$ length of fruit; stylopodium semispherical, with longitudinal wrinkles; styles as long as or twice as long as stylopodium. July–August.

Forest edges, meadows outside forests, slopes of gorges, banks of mountain streams. — Caucasus: S. Transc., Tal. Gen. distr.: Arm.-Kurd. Described from specimens collected by Sovich in Armenia (Shikhlyar). Type in Leningrad.

22. *H. lehmannianum* Bge. in Delect. sem. Hort. Dorpat. (1850) 2; Ej. in Mém. Ac. Sc. Pétersb. VII (1854) 311; Boiss. Fl. or. II, 1045.

Biennial or perennial; stem 1–1.5 m high, deeply furrowed, hairy; leaves pinnate-compound, of 2–3 pairs of lateral segments, first short-petiолuled, others sessile, segments ovate, pinnatifid into ovate, largely and unequally

toothed acuminate lobes, leaves glabrous above, usually with sparse hairs, rarely with dense, short, spreading hairs beneath. Umbels large, many-rayed (45–50), all rays with soft spreading hairs; involucre usually lacking, leaflets of involucre many, lanceolate-linear; flowers white; ovary spreading-hairy; calyx-teeth distinct; peripheral petals much enlarged, 10–15 mm long; fruit oblong or ovoid-oblong, 10–12 mm long, 6–8 mm wide, with sparse long thin hairs; dorsal canals $\frac{3}{4}$, commissural to $\frac{1}{2}$ length of fruit; stylopodium broadly conical, with longitudinal wrinkles; styles usually twice as long as stylopodium. July–August.

Subalpine belt, from 1,500 to 2,400 m, in damp habitats, usually river-banks. — Centr. Asia: Pam.-Al. Endemic. Described from near Samarkand. Type in Paris.

Economic importance. The plant may be used for the extraction of anethole. The leaves contain 0.3% oil per fresh weight of leaves, 80% of which is essential oil. The unripe fruits yield 2.07% essential oil and 25% fatty oil.

Section 3. *VILLOSA* Manden. Kavk. vidy r. *Heracleum* (1950) 55. — Sect. *Sphondylium* DC. l. c. p. p. — *Sphondylium* Hoffm. (pro gen.) l. c. p. p. — Flowers white, canals with more or less uniform clavate proximal expansion, dorsally broad, sometimes filling up median vallecule, $\frac{2}{3}$ – $\frac{3}{4}$, rarely to $\frac{1}{2}$ length of fruit, commissural canals broad or narrow, usually $\frac{1}{2}$ or $\frac{1}{3}$ length of fruit.

Note. Morphologically, this section represents a characteristic, slightly xerophytic group of species from the Caucasus, Crimea and Asia Minor. The species separated by us — *H. steveni* and *H. antasiaticum* — as well as *H. leskovii* Grossh., separated by the authors of "Flora of the Crimea and the Caucasus," have commonly been classed with *H. villosum* Fisch. Although the latter epithet has priority, we reject it, since Fischer's description refers to a plant of unknown origin cultivated in the Gorenkovskii garden. A brief diagnosis of *H. villosum* Fisch. was published in *Systema Vegetabilium* Roem. et Schult, with locality given as Siberia. However, no species of this section grows there. In this section also there are sometimes observed narrower accessory canals in the vallecule.

The dubious species of section *Villosa* was Bunge's type of *Barysoma*. Accessory canals are sometimes also observed in members of other sections of the genus but are of no decisive taxonomic importance.

23. *H. scabrum* Alb. in Tr. Tifl. Bot. Sada, I (1895) 115; Grossg., Fl. Kavk. III, 184.

Biennial or perennial; stem 1–1.5 m high, thin, furrowed-ribbed, usually glabrous in lower part, scabrous-hairy in upper part; radical and lower cauline leaves long-petioled, ternate, lateral segments petioluled, ovate, 248 oblique, deeply notched-lobed on outside, slightly so inside, terminal segment subrounded, cordate, usually 3-lobed nearly to base, lateral lobes ovate or ovate-oblong, median broadly ovate, trifid, rarely leaves pinnate-compound, of 2 pairs of lateral segments, second pair sessile, terminal segment trifid, with cuneate, decurrent base; upper leaves few, much reduced, with oblong, slightly expanding sheath, uppermost reduced to sheath

and small, entire, usually 3-lobed blade; leaves hard, fleshy, glabrous above, bearing prickly hairs along large-toothed margin, and along nerves beneath. Umbels of 8–12(20) rays, all rays very unequal with dense spreading papilli from hairs; leaflets of involucre 1–3, usually deciduous, of involucels many, unequal, with expanded base long and filiformly attenuate; flowers white; peripheral petals enlarged; ovary densely covered with long spreading hairs; calyx-teeth distinct, triangular, acuminate, with scarious border; fruit broadly obovoid, 8–10 mm long, 7–8 mm wide, dorsal surface with remote hairs; dorsal canals narrower than vallecular, usually not exceeding $\frac{1}{2}$ length of fruit, commissural broad, very short, not exceeding $\frac{1}{4}$ length of fruit; stylopodium broadly conical; styles as long as or slightly longer than stylopodium. July–September.

Middle, rarely upper mountain belt, light forest glades, clearings, sometimes on exposed slopes. — Caucasus: W. Transc. (western part of Main Range). Endemic. Described from Oshten. Type in Geneva.

24. *H. stevenii* Manden. ex Grossh., *Opred. rast. Kavk.* (1949) 238; Manden., *Kavk. vidy genus Heracleum* (1950) 61. — *H. villosum* auct. fl. taur. et auct. fl. cauc. p. p.

Biennial or perennial; stem to 1 m high, thick, furrowed, hairy; leaves simple, subrounded, lower pinnatilobate, lobes oblong-ovate, largely crenate-dentate; upper leaves with strongly expanded, densely hairy sheath, usually 3-lobed; leaves glabrous or with sparse fine hairs above, densely white-tomentose beneath. Umbels large, many-rayed, all rays finely scabrous-hairy; leaflets of involucre small, lanceolate, those of involucels lanceolate-linear; flowers white; ovary densely hairy; peripheral petals enlarged; 49 fruit oval, ovoid, often obovoid, 10–13 mm long, 7–9 mm wide, with fine, appressed, antrorse hairs, rarely with thin, long, entangled hairs; dorsal canals very broad, filling valleculae, median $\frac{3}{4}$ length of fruit, lateral slightly shorter, commissural broad, $\frac{1}{2}$ length of fruit or slightly longer; stylopodium conical; styles 2–3 times as long as stylopodium. June–July.

Stony slopes, taluses. — European part: Crim.; Caucasus: W. Transc. (Novorossiisk area). Endemic. Described from Goldie's Crimean specimens. Type in Tbilisi.

25. *H. leskovii* A. Grossh., *Opred. rast. Kavk.* (1949) 239; Manden. *Kavk. vidy r. Heracleum* (1950) 69. — *H. strelkovii* Grossh. *Fl. Kavk.* III (1932) 186 (sphalm. typogr.). — *H. pubescens* var. *Wilhelmsii* Alb. in *Tr. Tifl. Bot. Sada*, I (1895) 115, non Boiss. — *H. villosum* auct. fl. cauc. p. p.

Biennial or perennial; stem 40–70(100) cm high, deeply furrowed, ribbed, pubescent; leaves simple, lower long-petioled, rounded or broadly ovate, deeply pinnatilobate, lobes oblong, shallowly pinnatifid, irregularly toothed, upper leaves with much inflated usually toothed sheath and reduced, pinnatifid lobate blade; leaves finely scabrous-hairy above, more or less densely white-tomentose beneath. Umbels many-rayed, all rays finely scabrous-hairy; leaflets of involucre and involucels lanceolate-linear; flowers white; ovary densely pubescent; calyx-teeth barely visible; peripheral petals slightly enlarged; fruit subglobular or ovoid, rarely obovoid, 7–10 mm long, 6–8 mm wide, with scarious margin, usually beset with fine, appressed,

prickly, antrorse hairs, dorsal surface rarely covered with long, thin, short, prickly hairs; canals usually narrower than valliculae, dorsal reaching $\frac{3}{4}$, commissural canals slightly narrower, reaching $\frac{1}{2}$ length of fruit or slightly more. June–August.

Stony, pebbly slopes, taluses. — Caucasus: Cisc., W., E. Transc. (region of Main Range). Endemic. Described after Leskov's specimens at the Caucasian State Game Reservation. Type in Leningrad.

26. *H. antasiaticum* Manden. ex Grossh., Opređ. rast. Kavk. (1949) 239; Manden., Kavk. vidy r. Heracleum (1950) 64. — *H. villosum* auct. fl. cauc. p. p.

Biennial or perennial; stem 50–70(100) cm high, thick, deeply furrowed, 250 ribbed, spreading-hairy; leaves simple, radical and lower cauline long-petioled, their blade subrounded, deeply pinnatilobate, lobes broadly oblong, shallowly pinnatifid, irregularly toothed, upper leaves reduced, with strongly inflated, usually toothed hairy sheath and reduced pinnatifid blade, leaves finely scabrous-hairy above, densely white-tomentose beneath. Umbels many-rayed, all rays finely scabrous-hairy; leaflets of involucre and involucels lanceolate; flowers white; ovary densely pubescent; calyx-teeth indistinct; peripheral petals enlarged; fruit large, 13–15 mm long, 10–13 mm wide, broadly obovoid, strongly notched at apex, dorsal surface usually with remote, long, thin, slightly entangled hairs, margin with fine prickly hairs, seldom entire surface with small, appressed, prickly antrorse hairs, canals dorsally broad, dorsal filling valliculae, $\frac{2}{3}$ length of fruit, lateral shorter, the commissural canals narrow, $\frac{1}{3}$ length of fruit; stylopodium broadly conical; styles usually twice as long as stylopodium. May–July.

Middle, rarely upper mountain belt, rock crevices in gorges, dry stony slopes. — Caucasus: W. Transc. (S.), E. and S. Transc. Gen. distr.: Bal.-As. Min. (Artvin District), Arm.-Kurd. Described from near Tbilisi. Type in Tbilisi.

Economic importance. According to G. D. Yaroshenko, inhabitants of Kirovakan (Armenian SSR) gather large quantities of stems before flowering, for use as feed.

27. *H. grandiflorum* Stev. ex M. B. Fl. taur.-cauc. III (1819) 227, in nota ad *H. pyrenaicum*; Stev. in Nouv. Mém. Soc. Nat. Mosc. (VII) I (1829) 278; Ldb. Fl. Ross. III, 329. — *H. longifolium* M. B. secund. Steven in Mém. soc. Nat. Mosc. II (1812) 259, non M. B. nec Jacq. — *H. incanum* Radde, Mus. Cauc. II (1901) 99, non Boiss. et Huet. —

Biennial or perennial; stem 20–40(60) cm high, deeply furrowed-ribbed, scabrous-hairy; lower cauline leaves usually ternate or pinnate-compound, of 2 pairs of lateral segments, lower petioluled, upper usually sessile, segments ovate or oblong-ovate, oblique, more or less deeply pinnatifid, sometimes much elongating and pinnatisect nearly to axis into oblong decurrent lobes, terminal segment ovate or oblong-ovate, also pinnatifid, rarely radical leaves simple, deeply trisect nearly to base, their segments pinnatifid into 251 oblong lobes, upper leaves with much inflated sheath and reduced, usually trifid or trisect blade, leaves more or less densely covered with fine scarious hairs above, more or less densely white-tomentose beneath. Umbels large, many-rayed (30–40), all rays and stem more or less densely scarious-hairy,

leaflets of involucre usually deciduous, those of involucels linear-subulate, unequal; flowers white; ovary with dense long spreading hairs; peripheral petals very much enlarged, to 10 mm long; fruit 12–13 mm long, 7–8 mm wide, obovoid, deeply notched at apex, dorsal surface more or less densely covered with long scarious hairs, margin with sparse prickly hairs; dorsal canals $\frac{2}{3}$ length of fruit, commissural narrow, slightly divergent, $\frac{1}{2}$ length of fruit; stylopodium broadly conical; styles 2–3 times as long as stylopodium. May–July.

Dry stony slopes, pebbly taluses. — Caucasus: E. Transc. (Kuba district), Dag. Endemic. Described from a specimen with unripe fruits from Azerbaidzhan (Kuba district near Khinalug). Type in Helsinki.

Section 4. *WENDIA* (Hoffm.) Manden., Kavk. vidy r. *Heracleum* (1950) 70. — *Wendia* Hoffm. (pro gen.) l. c. 136; Grossg., Fl. Kavk. III (1932) 190. — *Heracleum* sect. *Wendtia* DC. Prodr. IV (1830) 194, p. p.; Ldb. Fl. Ross. II (1844–1846) 328, p. p. — Flowers white or pink, dorsal canals more or less uniformly broad, sometimes occupying middle of vallecule, usually $\frac{1}{3}$ to $\frac{1}{2}$ length of fruit, commissural canals undeveloped.

Series 1. *Pastinacifolia* Manden. — Stem cylindrical, stylopodium conical in fruit.

28. *H. pastinacifolium* C. Koch in Linnaea, XVI (1842) 360; Ldb. Fl. Ross. II, 328; Boiss. Fl. or. II (1872) 1047. — *H. brevivittatum* Ldb. l. c. (1844–1846) 324. — *H. sisianense* Boiss. et Buhse Aufz. (1860) 101. — *Wendia pastinacaefolia* (C. Koch) Grossh., Fl. Kavk. III (1932) 191, p. p.

252 Perennial; stem 1–1.5 m high, cylindrical, thinly furrowed, glabrous, its neck covered with remnants of scarious sheaths; leaves bright green, glabrous or covered with sparse, fine, appressed, bristly hairs, above paler, with more dense thin hairs beneath; lower leaves long-petioled, ovate-oblong, pinnate-compound, of 3–4 pairs of large-toothed segments, the first pair long-petioluled, ternate or pinnate-compound, the others usually sessile, ovate-oblong, more or less deeply pinnatifid; upper leaves reduced, with narrow, slightly inflated sheath. Umbels large, of 15–30 markedly unequal rays, all rays very finely hairy, involucre lacking, leaflets of involucels 2–3 small, linear; flowers white, sometimes pink; ovary finely pubescent; calyx-teeth lanceolate; marginal flowers slightly enlarged; fruit obovoid, 7–9 mm long, 4–5 mm wide, usually glabrous; dorsal canals $\frac{1}{2}$ length of fruit, lateral slightly shorter and wider; stylopodium conical; styles usually twice as long as stylopodium. June–August.

Mountain forests, glades, upper limit of forest. — Caucasus: E. and S. Transc. Endemic. Described from Armenia (apparently from Darachichag). Type was in Berlin, cotype in Leningrad.

29. *H. chorodanum* (Hoffm.) DC. Prodr. IV (1830) 194, p. p. et auct. fl. cauc.; Manden. in Zam. po sist. i geogr. Tbil. bot. inst. 12 (1944) 18. — *H. longifolium* M. B. Fl. taur.-cauc. I (1808) 223, non Jacq. —

H. chorodanum var. *simplicatum* E. Bordz. in Mém. Soc. Nat. Kiew, XXV (1915) 105. — *Wendia chorodanum* Hoffm. Gen. Umbell. (1814) 139; M. B. Fl. taur.-cauc. III, 228, p. p. (excl. var. η); Grossg., Fl. Kavk. III, 192, p. p.

Biennial; root fusiform, thickened, stem (40)80–100 cm high, cylindrical, furrowed, densely covered with long, bristly, appressed, retrorse hairs in lower part, with spreading, thin, pedunculate-glandular hairs in upper part; leaves with sparse, appressed, bristly hairs above, with dense soft thin hairs beneath, pinnate-compound, lower leaves long-petioled, oblong, of 2–3 pairs of subrounded, ovate or ovate-oblong, sometimes more or less deeply pinnatifid crenate-dentate segments, upper leaves reduced, segments with much elongated, lanceolate or linear, remotely serrate segments. Umbels of 7–12 rays, all rays with simple short, spreading and longer pedunculate-glandular hairs; involucre lacking, leaflets of involucels 2–3, small, linear, usually deciduous; flowers white; ovary covered with sparse spreading hairs; calyx-teeth small, triangular; peripheral petals much enlarged, 10–12 mm long, deeply 2-lobed, lobes oblong, markedly divergent; fruit obovoid, 6–9 mm long, 5–6 mm wide, distinctly notched at apex; dorsal canals $\frac{1}{2}$ length of fruit or slightly less; stylopodium conical; styles twice as long as stylopodium. June–August.

- 253 Central mountain belt, herbaceous slopes, shrubs, forest edges. — Caucasus: Cisc., E. and S. Transc., Dag. Endemic. Described from Kislovodsk. Type in Leningrad.

Series 2. *Transcaucasica* Manden. — Stem faceted-furrowed, stylopodium in ripe fruit broadly conical, slightly flattened.

30. *H. transcaasicum* Manden. ex Grossh., Opred. rast. Kavk. (1949) 240; Manden., Kavk. vidy roda *Heracleum* (1950) 74. — *H. pastinacae-folium* C. Koch var. *brachyactis* E. Bordz. in Mém. Soc. Nat. Kiew, XXV (1915) 101; var. *stenophyllum* E. Bordz. l. c. 102; var. *dissectum* E. Bordz. l. c. 103. — *Wendia pastinacaeifolia* (C. Koch) Grossh., Fl. Kavk. III (1932) 191, p. p.

Biennial or perennial; stem 60–100 cm high, deeply ribbed-furrowed, with short soft hairs; leaves glabrous above, with more or less dense soft hairs beneath, lower leaves long-petioled, ovate-oblong, of 3–4 pairs of large-toothed segments, lower pair long-petioluled in turn, pinnate-compound, of 2–3 pairs, rarely 1 pair, second order segments, these usually sessile, ovate-oblong or lanceolate, entire or more or less deeply pinnatifid, upper leaves progressively reduced, with much inflated sheath. Umbels of 15–18 rays, all rays with more or less dense spreading hairs; involucre usually lacking, leaflets of involucels lanceolate; flowers white; ovary spreading-hairy; calyx-teeth lanceolate; marginal flowers enlarged; fruit ellipsoid or obovoid, 8–9 mm long, 5–6 mm wide, sparsely covered with thin, fine hairs; dorsal canals reach $\frac{1}{2}$, lateral sometimes slightly less than half length of fruit; stylopodium broadly conical. June–August.

Subalpine meadows, rock streams in alpine belt. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. Described from Dzhavakhetia. Type in Tbilisi.

Note. Widespread in the Armenian Highland. A distinct form, var. *armenum* Manden., grows in rocky streams of the upper alpine belt, in the eastern part of the distribution area. This is generally distinguished by low growth (usually not more than 40 cm high) and the very markedly enlarged peripheral petals.

31. *H. roseum* Stev. in Mém. Soc. Nat. Mosc. III (1812) 260; Manden in Zam. po sist. i geogr. Tbil. Bot. inst. 12 (1944) 17. — *H. chorodanum* DC. Prodr. IV (1830) 194, p. p. et auct. fl. cauc. — *H. ligusticifolium* Akinf., Fl. Tsent. Kavk. (1894) 205, non M. B. — *Wendia chorodanum* Hoffm. var. η ? M. B. Fl. taur.-cauc. III (1819) 228. — *W. chorodanum* var. *roseum* (Stev.) Grossh., Fl. Kavk. III (1932) 192.

254 Biennial or perennial; root fusiformly thickened, its neck covered with fragmented dead sheaths, stem 20–60 cm high, faceted-furrowed, glabrous in lower part, with fine remote hairs in upper part; leaves glabrous above, more or less densely hairy beneath, pinnate-compound, lower long-petioled, ovate-oblong, of 3–4 pairs of ovate or ovate-oblong crenate-dentate segments, these sometimes more or less deeply pinnatifid, lower pair petioluled, others sessile, upper leaves reduced, sessile, with lanceolate, remotely toothed, sometimes nearly entire segments. Umbels of (5)8–12 rays, all rays densely spreading-hairy; involucre of 1–2 deciduous leaflets, involuclers of 3–5, lanceolate leaflets, usually deciduous in fruit; flowers bright pink; ovary with sparse spreading hairs; calyx-teeth lanceolate; peripheral flow-ers enlarged, their peripheral petals 5–6 mm long, deeply 2-lobed, lobes broadly oval; fruit ovoid, 6–7 mm long, 5–6 mm wide, with sparse thin hairs; dorsal canals $\frac{1}{3}$, rarely $\frac{1}{2}$ length of fruit; stylopodium broadly conical, with undulant margin; styles 2–3 times as long as stylopodium, recurved. July–August.

Subalpine meadows, 1,900–2,500 m, rarely on taluses or moraines in alpine belt. — Caucasus: Cisc., Dag., E. Transc. (central and eastern parts of Main Range). Endemic. Described from Kaishaur valley in Georgia. Type in Leningrad.

Note. A distinct ecological form, var. *schistosum* Manden., from 3,000 m in the alpine belt, has been described from S. Osetia. It is distinguished by the leaf segments being ternately dissected nearly to the base; the median lobe is much elongated, liguliform-linear, entire or remotely dentate, and slightly exceeds the lateral lobes.

32. *H. schelkovnikovii* Woron. in Izv. Kavk. Muz. VII, 3–4 (1913) 338. — *Wendia schelkovnikovii* (Woron.) Grossh., Fl. Kavk. III (1932) 190. — *W. hymenocoleon* Woron. ined. ex Grossg., Fl. Kavk. III (1932) 190. — Ic.: G. Woron. l. c. tab. 2. — Exs.: Herb. Fl. cauc. No. 94.

255 Perennial; rhizome long, multicipital, its neck covered with scarious remnants of sheaths; stem 10–25(40) cm high, thin, more or less deeply furrowed, simple or slightly branching; radical leaves long-petioled, pinnate-compound, usually of 3 pairs of segments, first long-petioluled, second short-petioluled, third sessile, segments broadly ovate or subrounded, usually irregularly incised, shallowly on inner side and at outer side to mid-rib, sometimes first pair of segments ternate, all segments largely

crenate-dentate; the few cauline leaves similar, slightly reduced, with strongly expanded sheath, their segments sometimes elongate, lanceolate-rhombic or lanceolate, nearly entire, with fine, remote, appressed hairs above, more or less densely spreading-hairy beneath. Umbels of 3–5(8) very unequal rays with short spreading hairs; involucre lacking, in lateral umbels rarely of 1–2 ovate, deciduous leaflets, leaflets of involucels 5–6, lanceolate, unequal, 2–3 sometimes as long as or slightly longer than flowering umbellets; ovary finely pubescent; calyx-teeth large, ovate-oblong, unequal; flowers white; peripheral petals much enlarged; fruit obovoid, 8–10 mm long, 5–6 mm wide; canals somewhat narrower than valliculae, the dorsal $\frac{1}{2}$ length of fruit, lateral shorter; stylopodium broadly conical; styles longer than stylopodium. July–September.

Rock crevices in alpine belt. — Caucasus: S. Transc. Endemic. Described from Murovdag Range. Type in Tbilisi, cotype in Leningrad.

Note. Shelkovnikov's extensive collections from Murovdag Range show this species to be highly variable. We have included in it *H. hymenocoleon* Woron., described by Yu. Voronov after a specimen collected on Kapudzhikha, distinguished by its obsolete stem and very large involucel leaflets; both these characters proved to be markedly variable in subsequent collections on Kapudzhikha.

33. *H. albovii* Manden. ex Grossh. Opred. rast. Kavk. (1949) 240; Manden., Kavk. vidy roda *Heracleum* (1950) 83. — *H. incanum* var. *lazicum* Boiss. Fl. or. II (1842) 1048; Alb. Prodr. Fl. Colch. 116; Lipskii, Fl. Kavk. 328; Medvedev in Tr. Tifl. Bot. Sada, XVIII, 2 (1919) 207. — *Wendia incana* var. *lazica* Grossh., Fl. Kavk. III (1932) 191.

Perennial; its neck covered with fragmented remnants of scarious sheaths; stem 20–25 cm high, thin, ribbed-furrowed, sparsely hairy; leaves glabrous or sparsely hairy above, with short thin hairs beneath, pinnate-compound, lower leaves long-petioled, ovate, of 3–4 pairs of segments
256 largely crenate-dentate, lower pair short-petioluled, ternate, others usually sessile, broadly ovate or subrounded, entire, asymmetrically incised, on the inside cut deep, sometimes reaching midrib, upper leaves reduced, with much expanded sheath. Umbels of 5–8(10) rays, all rays spreading-hairy; involucre usually lacking, leaflets of involucels 2–3, small, lanceolate, later deciduous; flowers white; ovary spreading-hairy; calyx-teeth small, ovate; peripheral flowers slightly enlarged; fruit broadly obovoid or ellipsoid, 8 mm long, 6 mm wide, covered with sparse thin hairs; dorsal canals filling vallicula, $\frac{1}{2}$ length of fruit, the lateral sometimes slightly shorter; stylopodium short-conical. August–September.

Alpine belt in stony places. — Caucasus: W. Transc. (Adzhar-Imeretian Range), E. Transc. (Trialet Range). Gen. distr.: As. Min. (Lazistan)? Described from Guria-Bakhmaro. Type in Tbilisi.

Section 5. *APIIFOLIA* Manden., Kavk. vidy *Heracleum* (1950) 84. — Sect. II. *Wendtia* Ldb. Fl. Ross. II (1844–1846) 328, p. p. — Sect. I. *Euheracleum* Boiss. Fl. or. II (1872) 1039, p. p. — Fruits with canals tapering and acuminate at lower end, septate for entire length, flowers white.

34. *H. apiifolium* Boiss. in Ann. sc. nat. (1844) 332; Fl. or. II (1872) 1047; Grossg., Fl. Kavk. III, 188; Manden. in Zam. po sist. i geogr. r. Tbil. Bot. inst. 12 (1944) 18. — *H. intermedium* Ldb. Fl. Ross. II (1844–1846) 328. — *H. pachyrrhizum* S. et L. in Nuovo Giorn. bot. ital. (1895) 82; Tr. Bot. Sada, XVI (1900) 195; Grossg., Fl. Kavk. III, 188. — Ic.: S. et L. in Tr. Bot. Sada, XVI (1900) tab. XXI.

Biennial or perennial; root fusiform, often thickened; stem 30–70 cm high, thin, narrowly furrowed, glabrous in lower, with dense fine hairs in upper part; leaves glabrous, pinnate-compound, lower long-petioled, ovate-oblong, of 2–3 pairs of ovate, ovate-oblong or subrounded largely and obtusely toothed segments, lower segments short-petioluled, usually more or less deeply tripartite, upper sessile, entire, terminal segment ovate or subrounded, sometimes more or less deeply tripartite; upper leaves of similar shape, reduced, sessile. Umbels of 7–15(20) rays, all rays like stem covered with soft spreading hairs (pedunculate-glandular under strong magnification), involucre lacking, leaflets of involucels 1–2, usually deciduous; flowers white; ovary finely pubescent; calyx-teeth indistinct; peripheral flowers of umbellets much enlarged, especially along periphery of umbel; peripheral petals of marginal flowers 10–12 mm long, deeply 2-lobed, lobes narrow, oblong; anthers purple; fruit ellipsoid, 5–7 mm long, 4–5 mm wide; dorsal canals $\frac{3}{4}$ length of fruit, commissural to $\frac{1}{3}$ or $\frac{1}{2}$; stylopodium conical; styles long, reflexed. July–August.

Very damp localities in subalpine belt, usually along mountain riverbeds. — Caucasus: W. Transc. Gen. distr.: Bal.-As. Min. Described from Oshe's specimens collected near Erzerum. Type in Geneva.

35. *H. ligusticifolium* M. B. Fl. taur.-cauc. I (1808) 124; III (1819) 227; Boiss. Fl. or. II, 1046; Shmal'g., Fl. I, 413 (excl. pl. Cauc.). — *Pastinaca ligusticifolia* Calest. in Webbia, I (1905) 246.

Biennial or perennial; root fusiform, its neck densely covered with brown, scarios, fragmented remnants of sheaths; stem 40–80 cm high, branching from base, reddish, deeply furrowed, with soft spreading hairs; leaves sparsely and softly pubescent or subglabrous, pinnate-compound, lower long-petioled, ovate, of 2–3 pairs of subrounded, large-toothed segments with broadly cuneate base, first pair long-petioluled, usually ternate, second entire, on shorter petiolules, segments entire (sic!); upper leaves of similar shape, reduced, sessile. Umbels of 12–15 rays, all rays with dense, soft and long spreading hairs; involucre lacking, leaflets of involucels 2–3, small, linear, sometimes deciduous; flowers white; ovary densely covered with spreading hairs; calyx-teeth distinct, triangular; peripheral flowers enlarged in umbellets; their peripheral petals 5–6 mm long, 2-lobed, lobes broad; anthers olive-colored; fruit ellipsoid, 9–10 mm long, 5–6 mm wide, with sparse thin hairs; dorsal canals $\frac{3}{4}$ length of fruit, lateral shorter, commissural arcuate, reaching nearly to base; stylopodium conical; styles long, reflexed. July–August.

. Stony places, taluses. — European part: Crim. (southern coast). Endemic. Described from the Crimea. Type in Leningrad.

36. *H. olgae* Rgl. et Schmalh. in Izv. Obshch. lyubit. estestv. antrop. i etnogr. XXXIX, 2 (1882) 38; O. and B. Fedch., Perech. r. Turk. IV, 112. —

Perennial; stem 80–100(120) cm high, thick, cylindrical, shallowly furrowed, with more or less dense spreading hairs, strongly branching from middle; leaves simple, lower ovate or broadly ovate, cut (usually not deeply) into 3 rounded small-toothed lobes, finely scabrous-hairy above, sparsely or densely hairy to white-tomentose beneath, upper leaves reduced with ovate, scabrous blade on expanded sheath. Umbels numerous, many-rayed, all rays with dense spreading hairs; involucre usually lacking, leaflets of involucre lanceolate, as long as rays; flowers yellowish; calyx-teeth distinct; petals hardly enlarged, densely spreading-hairy; fruit 10–12 mm long, 8–9 mm wide, broadly ellipsoid to subglobular, emarginate; 3 dorsal ribs narrowly keeled, bearing spreading scarious hairs, rest of fruit subglabrous; dorsal canals broad, filling valliculae, $\frac{3}{4}$ length of fruit, lateral slightly shorter, commissural broad, slightly arcuate, $\frac{1}{4}$ length of fruit; stylopodium broadly conical; styles long, recurved. July–September.

Stony taluses. — Centr. Asia: Pam.-Al. Endemic. Described from Zeravshan. Type in Leningrad.

37. *H. transiliense* (Rgl. et Herd.) O. et B. Fedtsch. in Perechn. rast. Turk. III (1909) 112. — *Semenovia transiliensis* Rgl. et Herd. in Bull. Soc. Nat. Mosc. XXXIX, 3 (1866) 79. — *H. pimpinellifolium* Rupr. in Mém. Acad. Sc. Pétersb. XIV, sér. VII, 4 (1869) 49. — *H. brignoliaefolium* Franchet in Ann. Sc. Nat. sér. VI, XVI (1883) 297. — Ic.: Rgl. et Herd. l. c. tab. III, f. 1–5.

Perennial; root fusiform; stem 20–30 cm high, thin, cylindrical, densely furrowed; lower leaves long-petioled, pinnate-compound, its segments broad, ovate to ovate-oblong, usually deeply pinnatisect, seldom nearly entire, dentate; upper leaves reduced, with strongly expanding sheath, the segments much elongated, usually entire, leaves glabrous or finely pubescent. Umbels of 4–8 rays, all rays densely spreading-hairy; leaflets of involucre and involucre large, lanceolate-oblong, as long as umbellets; flowers white; peripheral petals strongly enlarged, deeply 2-lobed, lobes broad, diverging at a slight angle; fruit ellipsoid or ovoid-oblong, 6–8 mm long, 4–5 mm wide; canals straight, dorsal filling valliculae, $\frac{3}{4}$ length of fruit, lateral sometimes shorter, commissural slightly narrower than dorsal, $\frac{3}{4}$ length of fruit; stylopodium broadly conical; styles slightly longer than disk, recurved. July–August.

Subalpine meadows. — Centr. Asia: T. Sh. Gen. distr.: Dzu.-Kash. Described from Zailiiski Ala-Tau. Type in Leningrad.

259 Note. Apart from the species mentioned from the flora of the USSR, the following have been recorded:

1. *H. clausii* Ldb. Fl. Ross. II (1844–1846) 323.

Ledebour reports for this plant: "In deserto caspio hinc inde, v. g. circa m. Ischapschtschi (Claus)." The specimen at the herbarium of the Botanical Institute of the Academy of Sciences of the USSR seems to be the original. We consider it to be none other than *Malabaila graveolens* (M. B.) Hoffm.

2. *H. jugatum* Boiss. Fl. or. II (1872) 1043.

High plant, leaves large, trisect, glabrous above, densely gray beneath, their segments very obtusely incised-lobate, lateral segments oblong, the

median ovate, parted into rounded, very finely and acutely toothed lobes; umbel rays numerous, thin, scabrous; flowers not seen; fruit small, subglabrous, obovoid-oblong, slightly notched at apex, 3 dorsal ribs protruding, canals narrow, filiform, $\frac{3}{4}$ length of fruit, commissural canals very close, parallel. Boissier reports for this plant: "Hab. loco non indicato in Transcaucasia, prob. in Ponto Lazico vel Cartalinia (C. Koch)."

In none of the herbariums searched were we able to find a plant fitting this description, though some features in the structure of the fruit — protruding dorsal ribs and very close parallel, commissural canals are so characteristic that they could not have failed to capture our attention. It is thus very doubtful whether the species grows in Transcaucasia. Nevertheless Boissier's diagnosis is given here.

3. *H. caspicum* DC. Prodr. IV (1830) 192; Ldb. Fl. Ross. II, 322.

Described by de Candolle (l. c.) after a specimen grown from seeds obtained from the Berlin Botanical Garden, labeled as originating from the coast of the Caspian Sea. However, reporting the species for the flora of Russia Ledebour (l. c.) adds: *mihi ignotum*. It is not known what *H. caspicum* DC. is actually like.

4. *H. cuneiforme* DC. Prodr. IV (1830) 194; Ldb. Fl. Ross. II, 326.

Described after specimens cultivated in the Botanical Garden in Geneva of unknown origin. De Candolle assumed that it originated in Siberia.

260 Genus 1070. **STENOTAENIA*** Boiss.**

Boiss. in Ann. Sc. Nat. sér. III, Bot. I (1844) 339; Boiss. Fl. or. II, 1052. — *Pentataenium* Tamamsch. in Izv. Arm. Fil. AN SSSR, No. 3-4 (1942) 113

Calyx 5-toothed, petals small, obovate or rounded, slightly notched, with small curved ligule, yellow or reddish; fruit much flattened dorsally, ribs narrowly filiform, 3 dorsal approximate, 2 marginal remote from them, close to winglike margin of mericarp, canals narrow, tapering at both ends, acuminate, distinctly partitioned over entire length, usually 4-5 per vallicula, 4-6 toward commissure, endosperm apparently enclosed in thick envelope, dorsally mechanical tissue interrupted under canals, canals adjacent to endosperm, interval between envelope and lateral ribs broad, transparent, stylopodium in flower flat, with undulant margin, becoming ampullaceous in fruit, styles long. Perennial herbs, with few-rayed umbels, involucre and involucre lacking or of few leaflets, deciduous in fruit.

Five to six species in Iran and Anatolia.

1. *S. daralaghezica* (Takht.) Schischk. in Grossg., Opred. (1949) 242. — *Heracleum daralaghezicum* Takht. in Adnot. ad Ind. sem. Hort. erevan. edit. (1940); Ej. in Not. syst. ac geograph. Inst. Bot. Tphilis 9 (1940) 24. — *Pentataenium daralaghezicum* (Takht.) Tamamsch. in Izv. Arm. Fil. AN SSSR No. 3-4 (1942) 113.

* Treatment by I. P. Mandenova.

** From the Greek *stenos* — narrow, *taenion* — small canal.

Perennial; plant to 1 m high, stem cylindrical, furrowed, branching, short-haired, leaves mainly concentrated in lower part of stem, pinnate-compound, of 3–4 pairs of sessile, subrounded, lobate-incised, unequally and largely toothed segments covered with appressed-setaceous hairs above, canescent, with more densely spreading hairs beneath. Umbels of 7–10 very unequal rays, all rays scabrous-hairy; flowers purple; fruit obovoid, large, 12–20 mm long, 10–15 mm wide, tapering toward base, dorsally with sparse fine hairs, sometimes with few bristly hairs, with small, antrorse, prickly hairs along winglike margin. July–August.

Shrubby thickets. — Caucasus: S. Transc. (Daralagez). Endemic. Described from Daralagez. Cotype in Leningrad.

261 Genus 1071. **MALABAILA*** Hoffm.

Hoffm. Gen. Umb. (1814) 125, non Tausch (1834)

Calyx-teeth indistinct; petals yellowish-greenish or yellow with inward curved tip; fruit broadly ovoid or subglobular, plano-compressed; stylopodium thickish, conical, with undulant margin, mericarps with indistinct, filiform dorsal broadenings and somewhat swollen marginal ribs, canals solitary in valliculae. Perennial herbs with simple- or bipinnate leaves; stem and leaves more or less pubescent.

To 10 species in the East Mediterranean area to Central Asia and Iran.

1. Fruit pubescent 2.
- + Fruit glabrous 3.
2. Main umbel of 18–25 rays (Caucasus) . . 1. *M. sulcata* (C. Koch) Boiss.
- + Main umbel of 6–12 rays (Centr. Asia) 2. *M. dasycarpa* (Rgl. et Schm.) Schischk.
3. Radical leaves simple-pinnate; fruit glabrous toward commissure 4. *M. graveolens* (M. B.) Hoffm.
- + Radical leaves bipinnate; fruit scabrous-hairy toward commissure 3. *M. dasyantha* (C. Koch) Grossh.

1. *M. sulcata* (C. Koch) Boiss. Fl. or. II (1872) 1055. — *Pastinaca sulcata* C. Koch ex Boiss. l.c.

Perennial; root ca. 1 cm thick, vertical, its neck densely covered with light brown remnants of petioles; stem 25–80 cm high, single, strongly ribbed, with dense soft spreading hairs in lower part, hairs sparser above or subglabrous, with oblique antrorse branches from middle or nearly from base, the upper usually overtopping main stem; radical leaves wilting, oblong, 8–15 cm long, 1.5–5 cm wide, canescent by soft short hairs, abruptly passing into oblong sheath, bi- or nearly tripinnatisect, primary and lower secondary lobes petioluled, lobes of last order pinnatisect into oblong rounded or acute teeth; cauline leaves similar to radical, often wider, the upper smaller,

262 sessile on expanded sheath. Terminal umbel 8–15 cm across, of 18–25 nearly equal, tuberculate-scabrous rays, lateral umbels smaller, of 7–11 rays;

* After Joseph Malabaila de Canal (Nowodworsky), curator of the Botanical Garden in Prague and chairman of the Prague Economic Society (1745–1825).



PLATE XXII. 1—*Tordylium maximum* L.; 2—*Laserpitium hispidum* M.B.

involucre of 3–7 lanceolate-linear, long-acuminate, recurved leaflets with scarious margin, sometimes lacking, especially in lateral umbels; umbellets 1.5–2 cm across, leaflets of involucels 3–7, similar to those of involucre, recurved; fruit obovoid, broadly ovoid, 5–6 mm long, 4–5 mm wide, mericarps with narrow swollen margins, dorsally stiff-haired, with 3 filiform acute ribs and 4 transparent, dark-colored canals $\frac{1}{4}$ length of mericarp, not reaching its base; commissure glabrous, with 2 slightly arcuately curved canals; stylopodium disk-like, with entire margins; styles straight, divergent April–May.

Clayey ravines, stony slopes, thinned-out shrubby formations. — Caucasus: E. Transc. Endemic. Described from Shemakha. Type in Geneva.

2. *M. dasycarpa* (Rgl. et Schmalh.) Schischk. comb. nov. — *Pastinaca dasycarpa* Rgl. et Schmalh. in Tr. Bot. Sada, V (1878) 598. — *Zosimia dasycarpa* Korov. in Bot. mat. gerb. Gl. Bot. Sada, V (1924) 82.

Perennial; stem 30–100 cm high, cylindrical, striated, slightly branching; leaves with short sparse hairs on petioles and along nerves, with petioles 20–50 cm long, 5–10 cm wide, pinnatisect, leaflets ovate, bidentate, with mucronate teeth, 3–7 cm long, 2.5–5 cm wide. Umbels of 6–12 unequal rays, very hairy, especially above; involucre of 5–7 lanceolate, long-acuminate leaflets with scarious margin, later deciduous; umbellets ca. 1 cm across, with hairy rays; involucels of 7–9 linear-lanceolate, acuminate, persistent, hairy leaflets as long as rays; calyx-teeth very short; petals whitish (?), dorsally hardly pubescent, with inward curved tip, the peripheral slightly elongated (to 2 mm); fruit plano-compressed, sparsely tomentose, with narrow marginal wings, ribs 6, hardly protruding; 1 broad canal per vallecule, 2 toward commissure. July–August.

Above floodplain terraces, ravines, cliffs. — Centr. Asia: T. Sh. (W.). Endemic. Described from Karabur pass in Tashkent Ala Tau, 2,400 m. Type in Leningrad.

265 Note. This species warrants further study, with a view to its possible separation into a genus of its own.

3. *M. dasyantha* (C. Koch) Grossh. in Opred. rast. Kavk. (1949) 242. — *M. pimpinellifolia* β . *dasyantha* Boiss. Fl. or. II (1872) 1056. — *Pastinaca dasyantha* C. Koch in Linnaea, XVI (1842) 359; Ldb. Fl. Ross. II, 320.

Perennial; root rather thick, sometimes tuberiform, to 2 cm thick, erect, its neck densely covered with fibrous remnants of leaves; stem straight in upper half, rarely branching from base, angular-ribbed, covered with sparse stiff hairs; radical and lower cauline leaves oblong, 10–15 cm long, 2–5 cm wide, with short petioles expanding to sheath, bipinnatisect, primary lobes short-petioluled, dissected into ovate-oblong, pinnatifid lobules, canescent, more or less densely covered with hairs. Terminal umbel 10–20 cm across, of 12–17 nearly equal rays, rays smooth or covered with sparse acute tubercles; lateral umbels of 6–8 smaller rays, often overtopping terminal umbel; involucre of 6–9 reflexed, linear-lanceolate, acuminate leaflets, with softly long-ciliate margin; umbellets ca. 15 mm across; involucels of 6–9 erect, linear-lanceolate, pubescent, finely acuminate leaflets; calyx-teeth inconspicuous; petals yellow, with inward curved tip,

dorsally pubescent especially in lower part; fruit broadly ovoid, covered with short stiff hairs, subglobular, 6.5–10 mm long, 5–8 mm wide, with indistinct filiform dorsal and swollen marginal ribs, 1–2 mm wide, thinly scabrous toward commissure. May–June.

Rocks, stony slopes, locally among crops. — Caucasus: E. and S. Transc. Gen. distr.: Arm.-Kurd., Iran. Described from Armenia. Type in Berlin.

4. *M. graveolens* (M. B.) Hoffm. Umbell. I (1814) 126; Boiss. Fl. or. II, 1055; Grossg., Fl. Kavk. III, 193. — *Pastinaca graveolens* M. B. Fl. taur.-cauc. I (1808) 237; III, 247; DC. Prodr. IV, 189; Ldb. Fl. Ross. II, 319. — *Heracleum graveolens* Spreng. Umbell. Prodr. (1813) 12. — *H. clausii* Ldb. Fl. Ross. II (1844–46) 323. — *Peucedanum biebersteinii* Schmalh. Fl. I (1895) 411. — Ic.: Hoffm. l. c. tab. IB, f. 6. —

266 Perennial; root ca. 1 cm thick; stem erect, ribbed, 30–80 cm high, simple or branching above, rather densely covered with soft, slightly spreading hairs; radical leaves with petioles nearly as long as blade, ovate, 7–20 cm long, 7–10 cm wide, simple-pinnate, densely short-haired beneath, less profusely so above; leaf lobes ovate, sessile, cuneately tapering to base, 5–9 cm long, 3–5 cm wide, with large unequal teeth; cauline leaves smaller, their blade sessile on expanded sheaths, the uppermost reduced to short sheath with rudimentary blade. Terminal umbel ca. 10 cm across, of 16–27 subglabrous rays; lateral umbels sometimes overtopping it, smaller, 3–5 cm across; involucre lacking; umbellets ca. 10 mm across; involucels of 1–5 herbaceous, linear-lanceolate, sometimes recurved leaflets; calyx-teeth inconspicuous; petals yellowish-greenish, with inward curved tip, sparingly pubescent or glabrous on outside; fruit glabrous, broadly ovoid, 5–7 mm long, 3.5–5 mm wide, with broad, outwardly slightly swollen margin nearly as wide as seed; canals long, marginal broader, 2 curved canals toward commissure, not reaching base of fruit. June–July.

Slopes and fields. — European part: Bes., Bl., Crim., L. Don, L. V. Transc. (southern part), M. D., U. Dns.; Caucasus: Cisc., Dag.; Centr. Asia: Ar.-Casp. Endemic (reported for Adrianople?). Described from the Crimea. Type in Leningrad.

Genus 1072. **ZOSIMIA** * Hoffm.

Hoffm. Umbell. ed. 2 (1816) 145. — *Pastinaca* sect. V. *Zosimia* Calest. in Webbia (1905) 247

Calyx-teeth distinct; petals white or pale yellowish-greenish, the peripheral sometimes elongate, obovate, notched, with inward curved lobule; stylopodium short-conical, with undulant margin; fruit plano-compressed, broadly ovoid or subglobular, with smooth swollen margin, separated from seed by broad transparent layer of pericarp; mericarps with filiform dorsal ribs and marginal ribs running along thickened margin; canals solitary, filling entire vallecula, 2 adjacent canals toward commissure; carpophore bipartite; albumen flat, dorsally slightly inflated. Perennial, pubescent herbs with bipinnatipartite leaves; involucre and involucels present.

* Named after Hoffman's contemporaries, Anastasii, Nikolai and Zoi — the three Zosima brothers — who lived in Moscow. They published many of the Greek classics at their own expense. In adopting this name Hoffman intended to demonstrate the triple affinity of this genus with *Pastinaca*, *Tordylium* and *Heracleum*.

1. Leaves bi- or tripinnate, umbels of 19–35 rays, fruit 10–11 mm long, pubescent toward commissure 2. *Z. absinthifolia* (Vent.) Link.
+ Leaves simple- or bipinnate, umbels of 9–25 rays, fruit 6–7 mm long, glabrous toward commissure 1. *Z. tordyloides* Korov.

1. *Z. tordyloides* Korov. in Bot. mat. Gerb. Glavn. Bot. Sada, V (1924) 82, p. p.

Perennial; root vertical or ascending, 0.5–1 cm thick, its neck covered with fibrous remnants of leaves; stem erect, 40–80 cm high, slightly curved at nodes, especially in lower part densely covered with soft hairs, angular-ribbed, branching; leaves oblong, canescent, densely covered with soft hairs; radical leaves numerous, their petioles shorter than blade, 5–15 cm long, 2–7 cm wide, simple- or bipinnate, with sessile, ovate, pinnatifid or lacinate lobes, 2.5–5 cm long, 1.2–3.5 cm wide; cauline leaves similar to radical, upper smaller, sessile. Umbel 5–10 cm across, of 9–25 scabrous-hairy rays; involucre of 7–9 linear-lanceolate, sometimes nearly entire, scarious, white-villous, spreading, 5–7 mm long leaflets; umbellets 1–1.5 cm across, 20–25-flowered; pedicels short-haired; involuclers of linear-lanceolate, scarious leaflets with white villous hairs, nearly as long as umbellet; calyx-teeth obtuse, indistinct; petals white, 1–2 mm long; ovary short-haired; fruit broadly ellipsoid, 6–7 mm long, 5–6 mm wide; stylopodium appressed-conical, with undulant margins; styles recurved, hardly longer than stylopodium. June–July, Fr. August–September.

Herbaceous and stony mountain slopes, ca. 2,000 m. – Centr. Asia: T. Sh., Pam.-Al. (Alai Range). Endemic. Described from Talass Ala Tau. Type in Leningrad.

2. *Z. absinthifolia* (Vent.) Link, Umb. (1814) 145; Ldb. Fl. Ross. II, 329; Boiss. Fl. or. II, 1037; Shmal'g., Fl. I, 412; Grossg., Fl. Kavk. III, 194. – *Heracleum absinthifolium* Vent. Choix des plantes (1803) tab. 7. – *H. tomentosum* Smith, Prodr. I (1806) 192. – *Tordylium absinthifolium* Pers. Syn. I (1805) 314. – *Zosimia orientalis* Hoffm. Umbell. ed. 1 (1814) 145. – *Zosimia absinthifolia* var. *microcarpa* Bge. Ind. sem. Hort. Dorpat a. 1837, p. 8. – *Z. absinthifolia* β . *viridiflora* Fisch. et Mey. Ind. sem. Hort. Petrop. ex Linnaea, XV, Litt. Ber. (1841) 124. – *Z. transcaspica* Gdgr. in Bull. Soc. Bot. France, LXV (1918) 32. – *Pastinaca absinthifolia* Calest. in Webbia, I (1905) 247. – Ic.: Hoffm. l.c. tab. 4; Vent. l.c. tab. 7. – Exs.: Fl. cauc. exs. No. 320; Sinten. No. 1530.

- 268 Perennial; root vertical, 1–2 cm thick, its neck densely covered with brown fibrous remnants of leaves; stems few or solitary, 10–60 cm high, erect, ribbed, simple or slightly branching, grayish-haired; leaves oblong or ovate-oblong, 7–35 cm long, 1–15 cm wide, bi- or tripinnatisect, terminal lobes oblong, pinnatifid into lanceolate, obtuse, rather densely and softly pubescent lobules, canescent. Umbels 8–18 cm across, of 19–35 hairy, unequal rays; involucre and involucels of 5–9 lanceolate, acuminate, densely villous-hairy leaflets; umbellets 1–2 cm across; calyx-teeth short; petals obovate, notched, with inward curved tip; fruit plano-compressed, 10–11 mm

long, 8–9 mm wide (6–7 mm long, 5–6 mm wide – var. *microcarpa* Bge.), soft-haired, especially at middle, commissure pubescent.

Stony slopes. – Caucasus: Dag., E. and S. Transc., Tal.; Centr. Asia: Ar.-Casp., Kara K., Mtn. Turkm. Gen. distr.: As. Min., Arabian Peninsula, Arm.-Kurd., Iran. Described from specimens grown from seeds collected between Baghdad and Kermanshah. Type in Paris.

Note. A markedly variable species. O. Kuntze (Tr. B. S. 7 (1887) 193) notes the varieties *normalis* O. Ktze. and *tereticaulis* O. Ktze. and the forms *glabrescens*, *angustiloba*, *grandiloba*, *exinvolucrata*, *stenocarpa*, and expresses his opinion that the species could be divided into a series of species. At the moment this is not feasible, as more complete collections at different stages of development are required for this purpose.

Genus 1073. **PLATYTAENIA*** Nevski et Vved.

Nevski et Vved. in Tr. Bot. inst. AN SSSR ser. 1, IV (1937) 270

Flowers bisexual, sulfur-yellow or whitish-yellowish, rarely purple, marginal petals elongate, rarely all petals equal. Fruit dorsally plano-compressed, elliptic; with more or less broad but not thickened rim, mericarps with 5 dorsal filiform ribs, middle 3 equidistant, lateral remote, canals broad, solitary, nearly filling up entire vallecule, 2 toward commissure. 269 Perennial herbs, sometimes slightly woody at base, with simple- or bipinnate leaves and developed involucre.

Seven species in the mountains of Central Asia.

- 1. Outer calyx-teeth long, ca. 1 mm, inner poorly developed. 2.
- + All calyx-teeth short, inconspicuous 3.
- 2. Umbels of 4–6 rays, leaflets 0.5 cm long (Turkestan Range).
- 5. *P. heterodonta* Korov.
- + Umbels of 10–18 rays, leaflets 0.5 cm long (Turkestan Range)
- 6. *P. komarovii* (Manden.) Schischk.
- 3. Ovary and fruit glabrous (Dzungarian Ala Tau)
- 7. *P. rubtzovii* Schischk.
- + Ovary and young fruit always pubescent, ripe fruit sometimes glabrous. 4.
- 4. Umbels of 15–25 rays. 4. *P. bucharica* (B. Fedtsch.) Schischk.
- + Umbels of (2)3–10 rays. 5.
- 5. Plants short-scabrous-hairy, subglabrous in upper half, marginal petals not elongating. 2. *P. depauperata* Schischk.
- + Plants more or less densely soft-haired, peripheral petals usually elongating 6.
- 6. Leaves simple-pinnate, with subrounded, dentate leaflets (Turkmenia) 1. *P. pimpinelloides* Nevski.
- + Leaves usually with deeply cut leaflets or bipinnate
- 3. *P. pamirica* (Lipsky) Nevski et Vved.

* From the Greek *platys* – flat, *taenion* – canal.

Section 1. EUPLATYTAENIA Schischk. — Ovary and fruit densely pubescent.

Series 1. *Pimpinellifoliae* Schischk. — All calyx-teeth equal, indistinct.

1. *P. pimpinelloides* Nevski in Tr. Bot. inst. AN SSSR, ser. 1, IV (1937) 271.

Perennial; stem 25–60 cm high, very short-haired, branching; radical leaves oblong-lanceolate, pinnatisect, with 2–4 pairs of leaflets, densely and thinly gray-haired, leaflets subrounded or ovate, 8–10 mm long, terminal larger, rounded-ovate, cordate at base, trisect, ca. 1.5 cm long, 2 cm wide, 270 with ovate teeth produced to attenuate mucro; upper cauline leaves short-petioled, pinnatisect, lobes linear or lanceolate-linear, entire. Umbels of 2–6, 1–3 cm long rays; general involucre of 2–4 linear-subulate leaflets; umbellets 9–15-flowered; pedicels velutinous-hairy, 3–4 mm long; involucels of 4–7 linear-subulate or linear-filiform, densely hairy leaflets; petals yellowish white, peripheral 2.5–3 mm long, 2-lobed or entire; young fruit ellipsoid, densely hairy, disk flattened, styles filiform, 1.5 mm long, recurved. July.

Stony slopes. — Centr. Asia: Mtn. Turkm., Pam.-Al. Endemic. Described from Khodzha-i-Fil' village (Kugitang). Type in Leningrad.

2. *P. depauperata* Schischk. sp. nova in Addenda XVI, 356.

Perennial; root rather thick, multicapital; stems 20–40 cm high, numerous or few, covered with very short rigid hairs, with few obliquely ascending branches; radical leaves numerous, oblong-linear, 4–25 cm long, 0.5–2 cm wide, with 2–5 pairs of ovate, sessile or short-petioluled incised-dentate leaflets; cauline leaves 2–3, smaller, terminal with reduced blade. Umbels 1–2 cm across (in flowers), of 2–5 unequal, hairy rays; involucre of 2–5 lanceolate, pubescent, acuminate leaflets with scarious margin, much shorter than rays; umbellets small, ca. 0.5 cm across; involucels of 5 leaflets similar to those of involucre; calyx-teeth inconspicuous; petals equal, yellowish-greenish, ca. 1 mm long; ovary and unripe fruit densely white-haired; stylopodium short-conical; styles recurved, 1–1.5 mm long; ripe fruit not known. July–August.

Stony slopes. — Centr. Asia: T. Sh., Pam.-Al. (Fergana Range). Gen. distr.: Sinkiang (Kashgaria, Ken-kol gorge). Described from C. Tien Shan (Kichik-Uzengish River). Type in Leningrad.

Note. Close to *P. pimpinelloides* Nevski, from which it differs in the peripheral petals not being enlarged, and their greenish color.

3. *P. pamirica* (Lipsky) Nevski et Vved. in Tr. Bot. inst. AN SSSR, ser. I, Fl. i sist. IV (1937) 271. — *Zosimia pamirica* Lipsky in Vidensk. Medd. fra den naturh. Foren i Kbnhv. (1903) 143 and in Tr. Bot. Sada, XXIII (1904) 155.

Perennial; entire plant covered with short, dense, flake-like hairs; stems 8–30 m high, rigid, numerous, their base covered with remnants of petioles, branching nearly from middle; leaves 7–8 cm long, 0.6–1.5 cm wide, crowded at base of stem, long-petioled, simple-pinnate, with 2–4 pairs of subrounded

271 leaflets dissected into linear lobules. Umbels 2.5–4 cm across, of 2–4 thinly and sparsely pubescent rays; involucre of 1–2 short, scarious, caducous leaflets; involucels of 2–4 ovate-lanceolate or linear, acute leaflets with white-scarious margin; petals sulfur-yellow, smooth, peripheral enlarged; young fruit short-haired, the ripe glabrous, ellipsoid, 10 mm long, 5 mm wide, with 3 acute ribs; commissural canals $\frac{3}{4}$ length of fruit. July–August. (Plate XXIII, Figure 4.)

Pebbly slopes, coastal pebbles, ca. 4,000 m. – Centr. Asia: Pam.-Al. Endemic. Described from Pamir near Yashil'-Kul' Lake. Type in Leningrad.

4. *P. bucharica* (B. Fedtsch). Schischk. sp. nov. in Addenda XVI, 356. – *Malabaila bucharica* B. Fedtsch. in herb.

Perennial; root thick, multicipital; stems few, 20–60 cm high, erect, with long, obliquely ascending branches nearly from base in lower half, with short-velutinous-hairy leaves; radical leaves oblong, 7–15 cm long, 2–8 cm wide, nearly bipinnatisect, primary lobes (especially lower) short-petioluled. Umbels 2.5–4 cm across, of 9–15 short-haired, unequal rays; involucre of 5–9 lanceolate, hairy, often colored leaflets with scarious margin, $\frac{1}{3}$ to $\frac{1}{4}$ length of rays; umbellets 0.8 cm across; involucels of 7–9 lanceolate, thinly acuminate, hairy leaflets with scarious margin, slightly shorter than rays; ovary and young fruit densely hairy; stylopodium short-conical, with undulant margin; styles reflexed, twice as long as stylopodium. June–July.

Sandy places, rock crevices, 2,300–2,400 m. – Centr. Asia: Pam.-Al. Endemic. Described from Yakkabag. Type in Leningrad.

Series 2. *Heterodontae* Schischk. – Outer calyx-teeth much longer than others.

5. *P. heterodonta* Korov. in *Notulae syst. ex Herb. Inst. bot. et zool. Ac. Sc. Uzbekistanicae*, VIII (1947) 5.

272 Perennial; canescent plant densely covered with short hairs; neck woody, branching, branches elongate, ascending, covered with membranous sheaths and fibrous remnants of leaves; stems 10–40 cm high, thin, many, erect, rarely curved, cylindrical, furrowed, densely pubescent, branching from middle; leaves clustered in lower part of plant, gray-haired on both surfaces, lower with thin, withering petioles gradually expanding into membra-
nous sheaths, blade oblong, bipinnatisect into 4–5 pairs of oval, incised-lobate, ca. 5 mm long sections, lobules 1–2 mm long, lanceolate, acute; sections of first and second orders sessile; cauline leaves sessile, with narrow, lanceolate sheaths, upper leaves bladeless. Umbels of 4–6 thickish, densely pubescent, ca. 10 mm long rays, with involucre of 5–7 unequal, lanceolate, herbaceous leaflets; umbellets 12–15-flowered, with involucels of 5–6 narrow, lanceolate, unequal leaflets as long as flowering umbellets; calyx-teeth lanceolate, unequal; petals cream-colored, hairy outside, in peripheral flowers bifid into rounded lobes, 2–2.5 mm long, otherwise obovate, concave, with inward curved short tip, 1 mm long; stylopodium flattened-conical, with undulant margin; styles 3 mm long; fruit (unripe) ellipsoid, gray-haired, 4 mm long, ribs filiform, the marginal hardly expanding along thickened border; resinous canals narrow, 2 toward commissure. July–August.

Rocky and pebbly slopes in alpine mountain belt, rock debris. — Centr. Asia: T. Sh. (W.). Endemic. Described from Turkestan Range. Type in Tashkent.

6. *P. komarovii* (Manden.) Schischk. in Addenda XVI, 357. — *Tordyliopsis komarovii* Manden. in litteris et in herb.

Perennial; stem to 100 cm high, cylindrical, glabrous or with sparse short thin hairs; leaves pinnate-compound, of 5–6 pairs of ovate, oblique, more or less incised, acutely toothed segments, glabrous above, very sparsely and finely pubescent beneath, sheaths not swollen, upper leaves reduced, with elongate, sometimes nearly entire segments. Umbels of (10)16–18 rays, all rays with soft and more or less dense spreading hairs; leaflets of involucre many, lanceolate-linear, pubescent, of involucels similar, as long as flowering umbellets; flowers white; calyx-teeth markedly unequal, 1–2 long, lanceolate, others short-triangular, inconspicuous; peripheral petals of marginal flowers much enlarged, deeply 2-lobed, lobes broad; anthers yellow; mericarps ovoid, 9 mm long, 6 mm wide, sparsely and finely pubescent or glabrous; canals reach nearly to base of mericarp, dorsal nearly filling vallecule, commissural similar, straight, closely approached; disk broadly conical; styles 3–4 times as long as disk. July–September.

Upper limit of woody-shrubby vegetation, 2,500–3,000 m. — Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from the watershed of the Shuran and Kyzylsu rivers, western slope of Karimzhag Mountain. Type in Leningrad.

273 Note. Mandenova included this plant in de Candolle's little-known genus *Tordyliopsis* DC. (Prodr. IV, 199) after an incomplete specimen and known only from E. India. Considering its similarity with the Central Asian *Platytaenia* Nevski et Vved., we prefer to include it here.

Section 2. *PSEUDOPLATYTAENIA* Schischk. sect. nova in Addenda XVI, 357. — Ovary and fruit glabrous.

7. *P. rubtzovii* Schischk. sp. nova in Addenda XVI, 357.

Perennial; stem 50–60 cm, erect, angled-ribbed, branching, covered with soft, flake-like hairs; radical leaves long-petioled, oblong, bipinnatisect, 10–15 cm long, ca. 2 cm wide, soft-haired; lobules of last order 2–5 mm long, 1 mm wide, acute; cauline leaves smaller, on expanded sheath. Umbels 2.5–8 cm across, of 7–13 pubescent, unequal rays; involucre and involucels of 5–7 lanceolate, acuminate, erect, densely and finely pubescent leaflets with broad scarious margin; umbellets ca. 1.2 cm across; pedicels hairy; calyx-teeth short-triangular; petals sulfur-white, with inward curved tip, dorsally faintly violet and soft-haired, peripheral much enlarged; fruit ellipsoid, 6–7 mm long, 5 mm wide, glabrous, with 3 filiform, acute, dorsal ribs and broad canals in vallecule and 2 broad merging canals at commissure. Fl. June, Fr. July. (Plate XXIII, Figure 5.)

Stony slopes and limestone cliffs. — Centr. Asia: Dzu-Tarb. (Dzungarian Ala-Tau). Endemic. Described from upper reaches of Usek River and Taldy-Bulak gorge. Type in Leningrad.

Genus 1074. **PASTINACOPSIS** Golosk.

Golosk. in Bot. mat. gerb. Bot. inst. AN SSSR

Calyx-teeth triangular, petals rounded, acute, keeled, inward curved, fleshy, reddish violet, hairy outside; stylopodium short-conical. Fruit compressed dorsally, globular, with slightly thickened border, hairy; ribs filiform, 3 approximate dorsal, the 2 marginal drawn back along edge of fruit; mericarps flat-crescent-shaped in cross section, with thin layer of mericarp, ribs in-
274 conspicuous, with 1 fibro-vascular fascicle and 1 resinous canal (resinous canals lacking in valliculae and at commissure), albumen slightly concave toward commissure. Perennial, pubescent plants, with simple-pinnate leaves.

A monotypic genus from the alpine belt of Tien Shan, close to *Hera-cleum* L. and *Pastinaca* L. from which it differs by the absence of vallicular and commissural resinous canals and by the acuminate petals.

1. *P. glacialis* Golosk. l. c. (1950) 198.

Perennial; plant 10–20 cm high, spreading over ground, root ca. 10 mm thick, long-conical, vertical, retracted, producing numerous reduced stems (caudices) with flower-bearing stalks or rosettes of leaves; stems simple, ascending, thin, faceted, 2–3 mm thick, often etiolated below, curved (covered with soil), greenish and violet with white spreading down above, 2–5 cm long; leaves green, rarely violet-green, pubescent, petiolate, radical similar to cauline, their petioles as long as blade, often several times longer and then petioles elongate and etiolated, violet-green only in upper part, rarely (in upper leaves) petioles shorter than blade; sheath semiamplexicaul, imperceptibly passing into petioles, leaf blade ovate-elongate, 2–5 cm long, 1.5–2 cm wide, simple-imparipinnate, with 3–6 pairs of leaflets which often overlap, rarely elongated, with remote leaflets; leaflets rounded-ovate, 8–16 mm long, 6–12 mm wide, with cordate, rarely cuneate base, deeply dissected into subsessile, oblong, wide, sometimes dentate lobes, rarely on petioles to 5 mm long. Peduncles slightly faceted, often violet-green, thin, 1.5–2 mm thick, 10–15 cm long, erect or ascending; umbels 2–3 cm across, of 4–7 antrorse more or less equal rays, 1.5–2 cm long; involucre of 3–5 short-triangular, rarely linear leaflets; involucels of 3–4 linear leaflets as long as or shorter than pedicels; flowers 4–6 per umbellet, on more or less equal, 2–5 mm long pedicels; peduncles, umbel rays, pedicels and leaflets of involucre and involucels with long and white spreading hairs, villous when young; flowers bisexual, ovary white-downy; petals rounded, ca. 1.5 mm across, acuminate, curved inward (especially at apex) midrib thickened (inside), keeled, reddish-violet, yellow at distal margin, white-downy outside; anthers yellow, rounded, with short thick filament curved inward in flower, at end of flowering twice as long as petals; stylopodium
275 rounded-conical, ca. 1 mm long and as wide, greenish yellow; styles thick, as long as stylopodium, arcuate inwards, with brown capitate stigma; fruit more or less flat, broadly winged, globular or subglobular, 5–6 mm across, yellowish-violet to green, pubescent outside, with 3 darker, approximate, filiform, arcuately curved dorsal and 2 similar lateral ribs, these far removed from the median and extending along the outer, thicker and greenish margin of fruit, flat toward commissure, greenish-brown, greenish-white,

thickened margin slightly curved inward, not uniting in upper and lower parts, which bear a small, transverse ridge; albumen transparent, more or less flat, rounded-elliptic, ca. 4 mm long, 3 mm wide, centrally situated in mericarp; carpophore filiform, partite; mericarps flat-crescent-shaped in cross section, its margin thickened, curved inward; layer of pericarp thin; seed coat slightly detached from pericarp; ribs inconspicuous, with small resinous canals above vascular bundles (these canals absent in valleculae and commissure); fibro-vascular bundles of marginal ribs much larger than the dorsal; inner part of pericarp with continuous ring of elements of mechanical tissue, their margins united with margins of fibro-vascular bundles; albumen flat-elliptic, somewhat broadly concave toward commissure, where it unites with fibro-vascular bundles of seed cover; surface of mericarp covered with 1-celled, transparent hairs. Fl. and Fr. August. (Table XXIII, Figure 2.)

Fine-earth, stony localities in glacial moraines and movable, small stone taluses in alpine belt in Tien Shan. — Centr. Asia: T. Sh. Endemic. Described from sources of Issyk and Zhazhgyryk rivers. Type in Leningrad, cotype in Alma-Ata.

Genus 1075. **ORMOSCIADIUM** * Boiss.

Boiss. in Ann. Sc. Nat. ser. 3, II (1844) 95

Calyx-teeth hardly discernible; petals white or pink-violet, obcordate, notched, with inward curved lobule, peripheral petals much enlarged; fruit compressed dorsally, mericarps scaphoid, inflated outside where scabrous and deeply concave, dorsal ribs (3) filiform, inconspicuous, marginal swollen, spongy, with 1 row of obtuse tubercles; canals lacking, commissure concave, slightly pubescent, with protruding median keel. Annuals, with involucre and involucels of subulate sometimes ternate-partite leaflets, and palmatisect leaves with subulate terminal lobes.

276 Two species, in SW Asia.

1. *O. pulchrum* Schischk. in Referat. nauchno-issl. rabot za 1945 g. Otdel. biolog. nauk. (1947) 10. — *O. aucheri* Grossh., Fl. Kavk. III 194, non Boiss.

Annual; root thin, vertical, not branching; stem 15–32 cm high, branching from base, very short-scabrous-hairy below, glabrous above; leaves on expanded sheaths with broad white scarious margin, subrounded, 2.5–5 cm long, 2.5–4.5 cm wide, palmatisect into hispid, elongate, mucronate, 1–5 cm long lobes. Umbels 3–4 cm across, of 7–11 thin, unequal, glabrous rays; involucre of 5–7 hispid, entire or 3-partite leaflets; umbellets ca. 1.5 cm across; involucels of 3 subulate slightly adnate leaflets, 2–3 times as long as umbellets; calyx-teeth hardly visible; petals pink-violet or whitish pink, rarely nearly white, to 5 mm long, deeply and unequally 2-lobed; fruit ovoid, 4 mm long, 2.5 mm wide. May–June. (Plate XXI, Figure 1.)

Stony slopes and taluses. — Caucasus; may occur in S. Transcaucasia, since it is known from the border areas (Kagyzman). Gen. distr.: Arm.-Kurd. Described from near Kharput. Type in Leningrad.

* From the Greek *ormos* — necklace, crown, *scias* — umbrella.

Genus 1076. **TORDYLIUM** * L.

L. Sp. pl. (1753) 240.—*Pastinaca* Sect. *Tordylium* Calest. in Webbia, I (1905) 247.—*Hasselquistia* L. Cent. pl. I (1755) 9.—*Condylocarpus* Hoffm. Gen. Umbell. ed 2 (1816) 202

Calyx-teeth distinct, unequal, persistent in fruit; petals white or pink, notched, with inward curved ligule, dorsally more or less pubescent, peripheral petals enlarged, 2-lobed. Fruit oval or suborbicular, dorsally flattened, in middle part flat, covered with prickly hairs, with spongy-thickened rugose or smooth margin; stylopodium conical; styles divergent or reflexed; stigmas capitate; mericarps with 3 filiform, hardly protruding ribs each containing a weakly developed fibro-vascular bundle; canals solitary under valleculae, 2–4 toward commissure; albumen flattened in cross section, slightly concave toward commissure. Annual, biennial or perennial, more or less pubescent herbs, with simple or bipinnate leaves.

277 About 6 species in the Mediterranean area and the Caucasus.

1. Leaves simple-pinnate, involucre and involucels present; fruit globular, with rugose margin; annuals 1. *T. maximum* L.
- + Leaves bipinnate, involucre and involucels lacking; fruit ovoid with smooth margins; biennials 2. *T. komarovii* Mand.

1. *T. maximum* L. Sp. pl. (1753) 240; Ldb. Fl. Ross. II, 380; Boiss. Fl. or. II, 1031; Shmal'g., Fl. I, 412; Grossg., Fl. Kavk. III, 194.—*Heracleum tordylium* Spreng. Umbell. Spec. (1813) 49.—*Pastinaca tordylium* Calest. in Webbia, I (1905) 247.

Annual or biennial; root fusiform, whitish, often branching; stem 30–100 cm high, furrowed, erect, usually branching from middle, middle and upper parts covered with short, setaceous, retrorse, appressed hairs, in lower part and at nodes hairs longer, spreading; radical leaves long-petioled, simple-pinnatisect with 2–4 pairs of leaflets with rounded or subcordate base, rounded-ovate, obtuse, sessile, obtusely toothed; median cauline leaves short-petioled or blade sessile on short bristly-hairy sheaths with narrow scarious margin; leaflets ovate-lanceolate or lanceolate, attenuate at base, with large obtuse teeth, sometimes slightly notched at base, covered with bristly hairs ca. 4 cm long; terminal leaflet oblong, sometimes 3-lobed. Umbels of 5–15 thickish rays with oblique declinate bristles; involucre of many lanceolate or linear-subulate, remote, herbaceous, short-bristly leaflets shorter than rays; involucels similar, nearly as long as umbels; flowers often bisexual or staminate, peripheral enlarged; calyx-teeth lanceolate, bristly-hairy; petals white, sometimes in lower part reddish, covered with appressed bristles, obcordate, with inward curved tip, peripheral petals enlarged; fruit 5–7 mm long, globular-ellipsoid, tuberculate, covered with short spines, with spongy thickened and rugose marginal wings, and thin dorsal ribs; canals solitary in valleculae, 2–4 toward commissure. June–July. (Plate XXII, Figure 1.)

Stony and shrubby slopes, forest edges, roadsides, near hedges, rarely among crops.—European part: Bes., Crim.; Caucasus: Cisc., Dag., E. and W. Transc., Tal. Gen. distr.: Centr. Eur., Med. (W. and E.), Bal.-As. Min., Arm.-Kurd., Iran. Described from Italy. Type in London.

* From Dioscorides' name — *tordylon*.

- 278 2. *T. komarovii* Manden. in Not. syst. ac geogr. Inst. bot. Tphilis. 9 (1940) 41. — Ic.: Manden. l. c. f. 1.

Biennial or perennial; root fusiform, its neck covered with remnants of sheaths; stem branching, ribbed, slightly violet at base, glabrous in lower part, with sparse short white hairs in upper part; lower cauline leaves ovate, long-petioled, bipinnatisect into 2–3 pairs of short-petioluled primary lobes, lobes of second order broadly ovate, toothed, terminal lobe larger than the others, 4 cm long, 2 cm wide, largely crenate-dentate; upper leaves with short petioles slightly expanding at base, and sublinear, entire, terminal lobes; uppermost leaves with short sheath and obsolete, linear or 3-partite blade. Umbels of 4–8 rays, umbellets 6–8-flowered, pedicels scabrous-hairy; involucre and involucels absent; calyx-teeth triangular-subulate, persistent in fruit; petals white, peripheral enlarged, more or less deeply 2-lobed, with acute inward curved liguliform tip, central flowers in umbellet very small, their petals entire, with acute inward curved tip, slightly hairy on the outside; ovary densely covered with rather long hairs; fruit oval, 7–8 mm long, 4–5 mm wide, dorsally compressed, pubescent, with 3 thin filiform dorsal ribs and much thickened glabrous margin; canals solitary in valleculae, 2 toward commissure; stylopodium short-conical; styles recurved, longer than stylopodium. July.

Pebbly slopes. — Caucasus: Dag. Endemic. Described from Dagestan. Type in Tbilisi.

Tribe 7. **LASERPITIEAE** Drude in E. u. P. Pflanzenfam. III, 8 (1898) 244, ex p. — Flowers bisexual or polygamous, all fertile on main umbel; calyx-teeth hardly discernible; petals sessile or tapering to more or less long claw, obcordate; stylopodium pulviniform; fruit dorsally compressed; secondary ribs more or less strongly protruding, often expanding to broad, entire, sometimes undulant wings.

Genus 1077. **POLYLOPHIUM** * Boiss.

Boiss. in Ann. Sc. Nat. Bot. (1844) 47. — *Acanthopleura* C. Koch in Bot. Zeit. (1849) 408. — *Galbanum* Don, Phil. Mag. IX (1831) 46 et in Trans. Linn. XVI (1833) 603; Benth. et Hook. Gen. I (1867) 1009

- 279 Calyx with 5 short teeth; petals obovate, notched, with inward curved lobule, white (in Russian species). Fruit oblong, subrounded in cross section. Primary and secondary ribs expanded into undulant-curly wings, secondary often more developed; canals solitary in secondary ribs; albumen nearly flat toward commissure. Perennial herbs with multipinnatisect leaves.

Five species in SW Asia.

1. *M. panjutinii* Manden. et Schischk. in Bot. zhurn. XXXIII, 3 (1948) 318. — Ic.: Manden. et Schischk. l. c. Figure 2.

Perennial; root thick, 1.5–2 cm across, its neck densely covered with dark brown remnants of petioles; stem erect, cylindrical, massive inside,

* From the Greek poly — many, lophos — elevation, crest, wing.

like leaves glabrous, with oblique antrorse branches sometimes nearly as long as main stem; radical leaves numerous, broadly ovate, 5–12 cm long, 2–4 cm wide, their petioles shorter or longer than blade, abruptly expanding into sheath, 3–4-pinnatisect, primary and secondary lobes with more or less long petiolules; lobules of last order narrowly linear, 2–6 mm long, 0.2–1 mm wide, acute; cauline leaves few, smaller. Umbels 3.5–7 cm across at flowering, enlarging in fruit, of 25–35 acutely scabrous rays; involucre of 6–8 lanceolate, acute leaflets with broad scarious margin, erect at first, later recurved, nearly as long as rays; umbellets many-flowered, ca. 1.5 cm across; involucels of 8 ovate-lanceolate or ovate, nearly entirely scarious, erect, later recurved leaflets, with finely ciliate margin, scabrous in green middle part, as long as or longer than umbellets; calyx-teeth short; petals white or slightly pinkish, ca. 1.5 mm long, obcordate, notched; fruit (unripe) ovoid, 4–5 mm long, 2–2.5 mm wide; stylopodium short-conical; styles flat, reflexed, twice as long as stylopodium. July–August.

Subalpine slopes, 1,800 m. — Caucasus; W. Transc. (Megrelia). Endemic. Described from Migaria River. Type in Leningrad.

Genus 1078. **LASERPITUM** * L.

L. Sp. pl. (1753) 248

Flowers usually bisexual, rarely pistillate or staminate; calyx-teeth well 280 defined, broadly or narrowly lanceolate, rarely elongate-subulate; petals white, reddish or pale yellow, all equal or peripheral, slightly enlarged, obcordate, abruptly tapering to short claw, notched, with inward curved lobule, glabrous or with few bristles outside; fruit broadly or narrowly ellipsoid; mericarps with 5 slightly protruding main ribs, containing fibro-vascular bundle, often covered with bristles, and 4 winglike secondary ribs, 2 narrower ones dorsal, 2 wider lateral ones adjacent to commissure. Canals solitary under secondary ribs; stylopodium conical or short-conical; styles erect, divergent or reflexed. Perennial, rarely biennial, glabrous or pubescent herbs, with biternate or bipinnate leaves, with involucre and involucels.

To 30 species, from the Canary Islands to Siberia and Iran, none in Siberia and Central Asia.

1. Leaflets of involucre (if present) glabrous or with thinly scabrous margin, oblong-linear or linear-subulate; leaflets of involucels subulate-filiform 2.
- + Leaflets of involucre with more or less long hairs along margin (at least distally), linear, oblong or ovate-lanceolate; leaflets of involucels lanceolate or subovate 4.
2. Stems 80–150 cm high; leaflets of radical and lower cauline leaves large, 5–12 cm long, 3–10 cm wide; umbels of 20–40 rays 1. *L. latifolium* L.

* From the Greek *laserion* — a resinous substance, extracted in ancient times from the root of *Ferula silphium*, and *piticein* — flow. According to Pliny, this plant is the source of the well-known juice — *silphium*.

- + Stems 35–80 cm high; leaflets of radical and lower cauline leaves 2–4 cm long and 0.8–2 cm wide; umbels of 10–20 rays 3.
- 3. Radical and lower cauline leaves biternate; petals white or pink, 1 mm long (Carpathians) 2. *L. alpinum* Waldst. et Kit.
- + Radical and lower cauline leaves bipinnate; petals pale yellow, 1.5–2 mm long (Caucasus) 3. *L. affine* Ldb.
- 4. Umbels of 30–60 glabrous rays; leaflets of involucre narrowly linear, with scarious margin, ultimately (sic!) often ternately or pinnately incised; fruit large, 10–11 mm long, 8–9 mm wide, glabrous 5. *L. stevenii* Fisch. et Trautv.
- + Umbels of 13–30 more or less hispid rays; leaflets of involucre lanceolate, with broad scarious margins, always entire; fruit 4–6 mm long, 3–4 mm wide; fruit with bristly hairs on primary ribs 5.
- 5. Stems glabrous above; petals white or yellowish white; fruit ovoid, 4–5 mm long, 3–4 mm wide 6. *L. prutenicum* L.
- 281 + Stems bristly-hairy above; petals yellow; fruit elliptic-oblong, 6 mm long, 4 mm wide 4. *L. hispidum* M. B.

Section 1. PLATYPHYLLA (Rchb. fil.) em. Thell. in Hegi, III. Fl. Mitt.-Eur. V, 2 (1926) 1475. — Stem thick, with fibrous remnants of leaves at base; sheaths of upper leaves inflated; petals white, glabrous; terminal leaf lobes broad, toothed.

1. *L. latifolium* L. Sp. pl. (1753) 248; Ldb. Fl. Ross. II, 335; Shmal'g., Fl. I, 415. — *L. glabrum* Crantz, Stirp. Austr. ed. I, III (1767) 50; DC. Prodr. IV, 204. — *L. asperum* Crantz, l. c. 50. — *L. commune* Mill. Gard. Dict. ed. VIII (1768) No. 1. — *L. paludapifolium* Mill. l. c. (1768) No. 3. — *L. crispum* Turra, Fl. Ital. Prodr. (1780) 65. — *L. libanotis* Lam. Encycl. III (1789) 423. — *L. cervaria* Gmel. Fl. Bad. I (1805) 657. — *L. pubescens* Lag. Gen. et sp. nov. (1816) 12. — *L. pseudosiler* Schur in Verh. Sieb. Ver. Natur. IV (1853) 30. — *L. "asperrium"* Schur, Enum. plant. Trans. (1866) 269. — *L. gracile* Schur, l. c. (1866) 269. — *L. wincleri* Herbich, Select. (1836) 11. — *L. podolicum* Rehmann in Verhandl. zool.-bot. Ges. XVIII (1868) 497. — *Daucus latifolius* Krause in Sturm, Fl. Deutschl. ed. 2, XII (1904) 148. — Ic.: Rchb. Ic. Fl. Germ. XXI, tab. 1985; Fedch. and Fler., Fl. Evrop. Ross. 708.

Perennial; root-neck densely covered with thin, rather long, capilliform, 6–7 cm long fibers remaining from dead leaves; stem 80–150 cm high, subcylindrical, with soft pith, glabrous, thinly ribbed, glaucous, slightly branching above; leaves with more or less long petioles expanding into oblong, 3–7 cm long sheath with scarious margin; lower leaves twice ternately dissected; primary lobes with long petiolules; leaflets of last order ovate, 5–7 (12) cm long, 3–4 (10) cm wide, obliquely cordate at base, secund, their margin shallowly toothed, scabrous, paler beneath, with acute bristles along nerves; leaflets of upper leaves narrowly lanceolate, entire, gradually tapering to petiole, with scabrous margin. Umbels of 15–40 unequal, acutely scabrous rays; involucre of 8–10 linear-lanceolate, thinly acuminate, glabrous leaflets; involucels of few filiform leaflets; pedicels acutely scabrous; petals white, notched; ovary hispid; fruit glabrous, ovoid, 6–10 mm long, 4–7 mm wide, with winged, undulant, secondary ribs. July.

Forests, frequently beech forests, shrubs, felled areas in forests, at edge of cliffs. — European part: Lad. Ilm. (south, Velikie Luki District),
282 Balt., U. Dnp., U. V., M. Dnp., Bes., U. Dns. Gen. distr.: Centr. and Atl. Eur., Scand. (S.), Bal., Med., Iran. Described from European forests. Type in London.

2. *L. alpinum* Waldst. et Kit. Pl. rar. hung. II (1805) 281. — Ic.: Waldst. et Kit. op. cit. III (1812) tab. 253; Rchb. Ic. Fl. Germ. XXI (1865) tab. 1986.

Perennial; root thick, ca. 1 cm across, vertical, oblique or ascending, its neck densely covered with dark brown fibrous remnants of leaves; stem 40–60 cm high, erect, very short-scabrous-hairy or subglabrous, thinly ribbed (striated), cylindrical, massive inside, slightly branching above or simple; radical leaves few, long-petioled, blade broadly triangular, biternate; leaflets ovate, sometimes broadly ovate, sessile or short-petioluled, 1.8–3 cm long, 1–2 cm wide, obtuse or acuminate, dark green and glabrous above, paler beneath, with short bristly hairs along nerves or with white, rather long bristles, rarely glabrous; cauline leaves similar to radical, their shorter petioles abruptly passing into expanded sheath, upper leaves sessile on amplexicaul sheath. Umbels 2.5–4 cm across, of 11–19 slightly unequal rays acutely scabrous above; involucre of 5–7 narrow lanceolate or linear, thinly acuminate, erect or spreading, glabrous leaflets with scarious margin; umbellets ca. 1 cm across; involucels of 6–8 filiform, sometimes hispid leaflets nearly as long as umbellets; petals white, ca. 1 mm long, notched, with inward curved lobule, glabrous on the outside; stylopodium conical; styles after blossoming nearly twice as long as stylopodium, divergent, ultimately reflexed. June–July.

Mountain meadows. — European part: U. Dns. (Carpathians). Gen. distr.: W. Carpathians. Described from the Carpathians. Type in Budapest.

3. *L. affine* Ldb. Fl. Ross. II (1844) 335; Grossg., Fl. Kavk. III, 195. — *L. leucolaenum* Boiss. et Bal. ex Boiss. Fl. or. II (1872) 1065.

283 Perennial; root erect, thickened above; stem erect, 35–80 cm high, glabrous, ribbed, slightly branching above; radical and lower cauline leaves with long petioles abruptly expanding into amplexicaul sheath, their blade broadly triangular, 10–15 cm long, nearly as wide, bipinnate, lobes of second order ovate-oblong, 2–4 cm long, 0.8–1.5 cm wide, entire or trifid, cuneate or truncate at base, bidentate; petioles, petiolules and lower side of nerves with long, stiffish, spreading or semi-appressed white hairs; uppermost leaves small, sessile on inflated sheath. Umbels of 12–20 subglabrous rays; involucre and involucels multifoliate, their leaflets oblong or linear-oblong, with broad scarious, slightly scabrous margin, mucronate, spreading or recurved, usually pale yellow; leaflets of umbellets acutely scabrous above; calyx teeth ovate acuminate; petals pale yellow, 1.5–2 mm long, notched, with inward curved tip; stylopodium conical, styles longer, recurved; fruit with indistinct secondary ribs, lateral wings cross striated, nearly as wide as mericarps. July–August.

Alpine and subalpine meadows. — Caucasus: W. Transc. Gen. distr.: Pontus Range. Described from Guria. Type in Leningrad.

Section 2. DAUCOPSIS Thell. in Hegi, III. Fl. Mitt.-Eur. V, 2 (1926) 1476. Biennial and perennial plants, without fibers at stem base; petals hairy on outside, usually yellowish when dry; main ribs of fruit often with straight spreading bristles.

4. *L. hispidum* M. B. Fl. taur.-cauc. I (1808) 221; DC. Prodr. IV, 206; Ldb. Fl. Ross. II, 396; Boiss. Fl. or. II, p. 1064; Shmal'g., Fl. I, 415; Grossg., Fl. Kavk. III, 195. — *L. pilosum* Willd. Enum. Horti Berol. (1809) 310. — *L. pilosum* α . *hispidum* Hoeft, Cat. Kursk. (1826) 23. — *Daucus hispidus* Callier in sched. ad pl. exs. No. 615 (1900). — Ic.: DC. Coll. mém. V, tab. 3, flowers. — Exs.: G. R. F. No. 1066; Callier, Iter. taur.-tert. No. 615; Dörfl. Herb. norm. No. 4329. —

Perennial; root fusiform, thickened, aromatic; stem to 40–120 cm high, with sparse, long, whitish, more or less spreading, bristly hairs above, in lower part hairs more profuse, retrorse; radical leaves triangular, 10–35 cm long, nearly as wide, bi- or nearly tripinnatisect, with more or less long petioles, primary and secondary lobes petioluled, broadly ovate, dentate or in turn pinnatifid, 1–1.5 cm long, 0.8–1 cm wide. Umbels 4–8 cm across, of 20–30 spreading-hairy rays; involucre of many lanceolate, acute, hairy leaflets with scarious margin, 10–15 mm long, 5 mm wide, ultimately recurved; umbellets ca. 1 cm across, with densely pubescent rays; leaflets of involucre many, linear, acuminate, with scarious margin, as long as umbellets or longer; petals yellow, deeply obcordate, with long inward curved tip; fruit elliptic-oblong, 6 mm long, 4 mm wide, primary ribs filiform with 284 2 rows of long and short, divergent white bristles, secondary ribs expanding, membranous, shiny, eroded-dentate, lateral wings nearly as wide as commissure, the dorsal narrower, canals solitary in valliculae, 2 toward commissure. June–July. (Plate XXII, Figure 2.)

Meadow slopes, chalk outcrops, rocks, escarpments, marly limestones, coastal gravels. — European part: L. Don, Crim.; Caucasus: Cisc., W. and E. Transc. Gen. distr.: Artvin district. Described from the Crimea and Caucasus. Type in Leningrad.

5. *L. stevenii* Fisch. et Trautv. in Ind. sem. Hort. Petrop. IV (1837) 40. — *L. dauciforme* Schmalh. ex Akinf. in Izv. Kavk. otd. Geogr. obshch. (1892) 207; Ber. d. Deutsch. Bot. Ges. X (1892) 289; Grossg., Fl. Kavk. III, 195. — *L. platyspermum* Somm. et Lev. in Nuovo Giorn. bot. ital. (1895) 83; Tr. Bot. Sada, XVI (1900) 198; Grossg., Fl. Kavk. III, 196.

Perennial; stem thick, ca. 1 cm across, 100 cm high, furrowed, hairy below, glabrous above, with whitish hairs at internodes; radical leaves with petioles as long as blade, triangular, 30–40 cm long, 20–30 cm wide, tripinnate, petiolules with bundle of rather long hairs at base, tertiary lobes ovate-lanceolate, petioluled, at base pinnatisect, at apex deeply pinnatifid, lower lobules of last order lanceolate, acute, with short mucro, hairy beneath, glabrous above. Umbels large, of 30–60 glabrous rays, 7–9 cm long; leaflets of involucre many, narrowly linear, nearly $\frac{1}{3}$ or $\frac{1}{2}$ length of rays, pubescent, persistent, recurved, in part ternately or pinnately incised; umbellets of 30–40 rays scabrous inside; involucre narrowly linear; calyx-teeth more or less pubescent, subulate, as long as stylopodium;

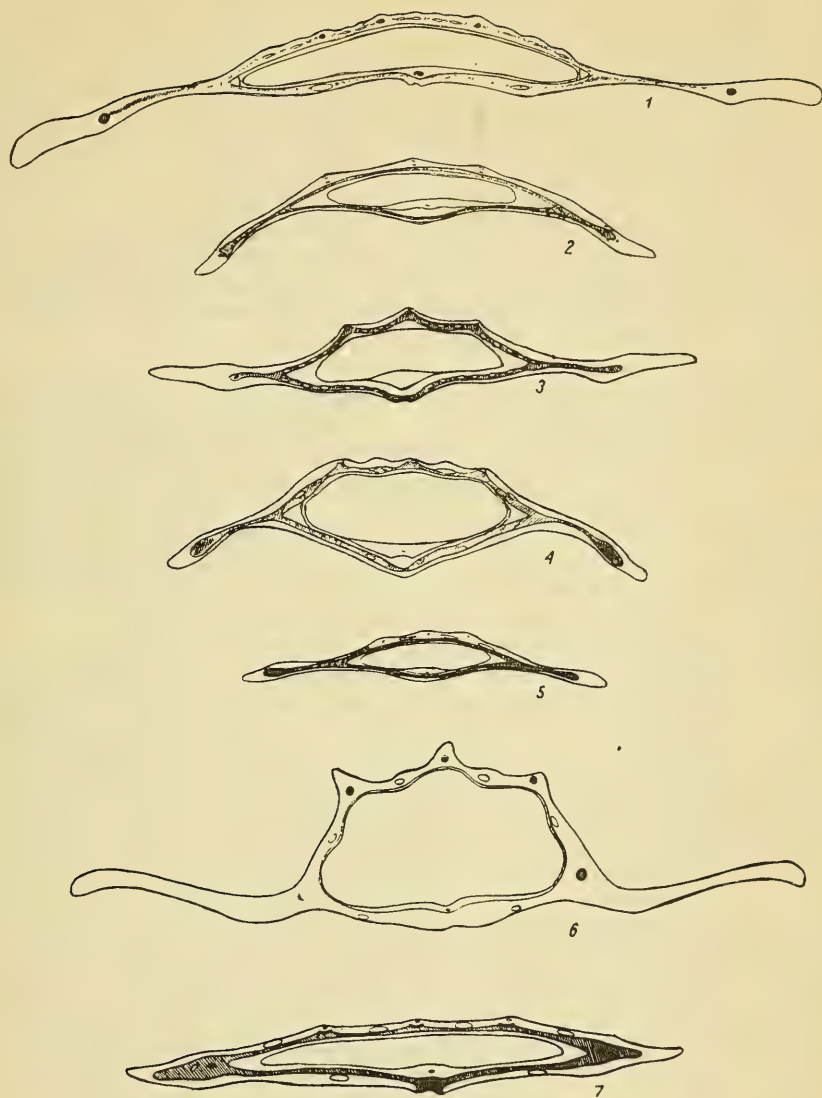


PLATE XXIII. Schematic drawings of mericarps in cross sections: 1—*Stenotaenia daralaghe-zica* (Takht.) Schischk.; 2—*Pastinacopsis glacialis* Golosk.; 3—*Schumannia karelinii* (Bge.) Korov.; 4—*Platytaenia pamirica* (Lipsky) Nevski et Vved.; 5—*P. rubtzovii* Schischk.; 6—*Xanthogalum purpurascens* Lallemand.; 7—*Soranthus meyeri* Ldb.

petals yellowish; fruit smooth, dorsally compressed, ovate-elliptic, 10–11 mm long, 8–9 mm wide, notched at base and apex, 5 primary ribs filiform, 4 secondary ribs expanding into very unequal, yellowish, shiny wings, lateral ribs entire, slightly undulant, 3–3.5 mm wide, wider than commissure, the dorsal 3–4 times narrower; canals large, solitary in valliculae, 2 toward commissure; albumen concave inside; carpophore 2-partite nearly to base; styles recurved, 3 times as long as stylopodium; fruit aromatic. July.

- 287 Mountain meadows, coniferous forests, ca. 2,000 m. — Caucasus: Cisc., W. Transc. Endemic. Described after a plant grown from seed sent by C. Steven. Type in Leningrad.

Note. The present name has priority over the generally accepted *L. dauciforme* Schmalh.; Fischer and Trautvetter's diagnosis leaves no doubt that this species has previously been described from a cultivated specimen grown from seed sent by Steven, the description of which perfectly fits the present species.

6. *L. prutenicum* L. Sp. pl. (1753) 248; DC. Prodr. IV, 206; Ldb. Fl. Ross. II, 336; Shmal'g., Fl. I, 415. — *L. selinoides* Crantz, Stirp. Austr. ed. 1, III (1767) 182. — *L. hirsutum* Gilib. Fl. lithuan. I (1782) 13. — *L. athamantae* Spreng. in Schult. Syst. veg. VI (1820) 624; DC. Prodr. IV, 206; Ldb. Fl. Ross. II, 336. — *L. daucoides* Duf. ex DC. Prodr. IV (1830) 206. — *Selinum hispidum* Clairv. Man. d'herborisat. (1811) 80. — *Daucus prutenicus* Krause in Sturm's Flora 2 A. Schrift. Deutsch. Lehrer-Ver. Naturk. XIV (1904) 146. — Ic.: Syreishchikov, III. Fl. Mosk. gub. II, 420. — Exs.: G. R. F. No. 718.

Biennial; root long, vertical, not thick; stem 50–120 cm high, with few antrorse branches above, in lower part densely covered with bristly spreading hairs, in middle part hairs sparser, upper part glabrous; leaves with long petioles, bi- or nearly tripinnate, blade generally broadly triangular or oblong; petioles of lower leaves densely hispid; leaflets of second order lanceolate or ovate, lower deeply pinnatifid nearly to midrib; median leaves dentate, upper nearly entire, acute, with scabrous margin, hispid along nerves beneath. Umbels of 13–25 rays strongly hispid above; involucre of 9 linear-lanceolate acuminate retrorse leaflets with broad scarious margin, 1.2–1.3 cm long; umbellets many-rayed; involucels of many linear-lanceolate, nearly entirely scarious, recurved leaflets; fruit ovoid, 4.5 mm long, 3–4 mm wide, with short stiff hairs along main ribs. July–August.

Oak, larch-pine forests, pine forests, illegal fellings, shrubs. — European part: Balt., U. Dnp., M. D., U. Dns., U. V., V.-Don, L. Don, V.-Kama (W.), Transv., Bl. Gen. distr.: Atl. and Centr. Eur., Bal., Med. (W., rarely). Described from Prussia [sic]. Type in London.

Tribe 8. DAUCEAE Drude in E. u. P. Pflanzenfam. III, 8 (1898) 247.

- 288 Flowers bisexual or in part asexual; petals notched, with inward curved lobule often enlarged and then deeply obcordate, unequally 2-lobed; stylopodium more or less flat; fruit ellipsoid or oblong, main ribs beset with bristles, hardly protruding, secondary ribs with 1 row of long spines dilated at base; albumen flat toward commissure; pericarp devoid of crystals.

Genus 1079. **DAUCUS** * L.

L. Sp. pl. (1753) 242. — *Daucus* subgenus α . *Daucus* Rchb. Consp. regni vegetabil. (1828) 142. —
 Staflinus Rafin. New. Fl. Am. IV (1836) 28. — *Platyspermum* Hoffm. Gen. Umbell. (1814) 64. —
 Carota Rupr. Fl. ingr. (1860) 468

Calyx-teeth inconspicuous; petals white, reddish or yellowish, obovate, notched, with inward curved lobule, peripheral petals distinctly enlarging; stylopodium short-conical, styles spreading, 2–3 times as long as stylopodium, ultimately recurved, stigma capitate; fruit ovoid or ellipsoid; mericarps nearly semi-rounded in cross section, with 5 main and 4 secondary ribs, main ribs filiform, usually with 2 rows of acute, often slightly curved bristles, secondary ribs with uniseriate, subulate spines, these dorsally slightly compressed, adnate at base to produce distinct border, with villous papillae beneath, and crown of hamate appendages above; middle layer of pericarp of elongate, narrow, thickened and woody cells in inner half, of thin-walled, not woody cells in outer half; canals solitary under secondary ribs, 2 toward commissure; albumen flat or broadly notched toward commissure; carpophore entire. Biennial, rarely annual or perennial herbs, with multipinnatisect leaves.

Up to 60 species, mainly in the Mediterranean area, but also in Africa, Australia, New Zealand and N. and S. America.

1. Root whitish, thin, inedible 1. *D. carota* L.
 + Root fleshy, edible, colored 2. *D. sativus* (Hoffm.) Roehl.

1. *D. carota* L. Sp. pl. (1753) 242, var. β . et γ . excl.; Ldb. Fl. Ross. II, 338; Boiss. Fl. or. II, 1076; Shmal'g., Fl. I, 416; Grossg., Fl. Kavk. III, 196. — *D. sylvestris* Mill. Gard. Dict. ed. VIII (1768) No. 1. — *D. vulgaris* Neck. Delic. Gallo-Belg. (1768) 139. — *D. hispidus* Gilib. 289 Fl. lithuan. II (1772) 10. — *D. maritimus* With. Bot. Arr. ed. 3, II (1796) 290, non Lam. (1783). — *D. carota* var. *caucasicus* Hoffm. Umbell. gen. ed. 2 (1816) 63, 204. — *D. allioni* Link, Handb. I (1829) 344. — *D. mauritanicus* All. β . *pterochlaena* DC. Prodr. IV (1830) 212; Ldb. Fl. Ross. II, 339, non All. — *D. agrestis* Rafin. New Fl. Am. IV (1836) 27. — *D. exiguus* Steud. Nom. ed. 2, I (1840) 485. — ? *D. baccarianus* Bge. Rel. Lehmann. Bot. (1851) 136; Boiss. Fl. or. II, 1077. — *D. montanus* Schmidt ex Nym. Consp. (1854–1855) 279. — *D. marcidus* Timb. in Bull. Soc. Bot. Fr. XIII (1866) CLV. — *D. glaber* Opiz ex Čelak. Prodr. Fl. Boehm. III (1874) 582. — *D. australis* Kotov. in Bot. mat. zhurn. I, No. 2 (1940) 278. — ? *D. exarmatus* Korov. in Bot. mat. gerb. Inst. bot. izool. AN UzSSR, XII (1948) 23. — *Caucalis carota* Huds. Fl. Angl. ed. 2 (1762) 114. — *C. daucus* Crantz. Stirp. Austr. ed. 1, III (1769) 125. — *C. carnosa* Roth, Tent. Fl. Germ. I (1778) 119. — *Carota sylvestris* Rupr. Fl. ingr. (1860) 468; Sert. tiansch. (1866) 49. — Ic.: Hoffm. Gen. Umbell. ed. 2 (1816) Frontsp. f. 1 (fr.); Rchb. Ic. Fl. Germ. XXI, tab. 2000. — Exs.: G. R. F. No. 63.

Biennial, rarely annual; root fusiform, commonly whitish; stem 25–100 cm high, furrowed, simple or branching above, like leaves scabrous-hairy (rarely subglabrous); leaves triangular, ovate or oblong, 14–20 cm long, 4–6 cm wide, 2–4-pinnate, lower with more or less long petioles, upper sessile on oblong sheath with white-scarious margin; lobules of last

* From the Greek *danein* — to burn, referring to the burning taste of the seeds.

order ovate or oblong, obtuse, with short mucro, dentate or incised, margin slightly rolled downward, obtuse. Umbels 4–10 cm across, 50-rayed, rays scabrous-hairy, flowering umbels flat or convex, compact in fruit; involucre of many 3-partite or pinnate leaflets with narrow scarious margins in lower part, nearly as long as umbels; umbellets 1–2 cm across, many-flowered, leaflets of involucre many, linear-subulate or oblong or narrowly ovate, inner entire, nearly wholly membranous, outer nearly wholly herbaceous, with narrow scarious margins, often 3-partite or 3-toothed, rarely pinnate, all with more or less ciliate margin; flowers in part bisexual, otherwise staminate (particularly in lateral umbellets); middle umbellet, in center of umbel is reduced to a dark red (often cleistogamous) flower; calyx-teeth small but visible, triangular-ovate; petals white or yellow (sulfur-yellow when dry), rarely pink or purple, obcordate, villous inside, smooth or with remote hairs outside, notched, with inward curved lobule; peripheral petals enlarged, to 2–3 mm long, 2-lobed to middle; fruit 3–4 mm long, 1.5–2 mm wide. May–July.

- 290 Shrubs, forest edges, roadsides, fields, kitchen gardens, orchards. — European part: Lad.-Ilm., Balt., U. Dnp. M. D., U. V.-Kama (W.), V. Don, Bes., U. Dns., Bl., L. Don, L. V.; Caucasus: everywhere; Centr. Asia: Balkh., T. Sh., Pam.-Al., Sur D., Amu D., Kyz. K., Kara K., Mtn. Turkm. Gen. distr.: Scand. (S.), Centr. and Atl. Eur., Med., escaped in N. and S. America, Australia and New Zealand. Described from Europe. Type in London.

Economic importance. Wild carrot is a weed in the south European part of the USSR, Caucasus and Central Asia. Because of the stiffness of the stem and the spinose fruits, it is of little value as fodder. The essential oil of the fruits and leaves contains the spirit daucol.

Note. In the USSR, Rubashevskaya (Trudy po prikl. bot. gen. i sel. XXVI (1931) 211) has separated *D. carota* into the two subspecies — subsp. *orientalis* Rubasch. (Central Asia, SW Asia, Caucasus, Iran, Afghanistan) and subsp. *occidentalis* Rubasch. (European part of USSR and Caucasus), ignoring previously described subspecies or varieties. In 1932, Zagorodskikh (Doklady Akad. Nauk, 25, no. 6 (1939) 522–555), again without referring to available literature, established the following 5 subspecies: 1) subsp. *afganicus* Zagor. (all Asia, Africa and part of Europe), 2) subsp. *syriacus* Zagor. (Syria, Palestine, Iraq, Iran, Africa), 3) subsp. *cilicicus* Zagor. (Cilicia), 4) subsp. *mediterraneus* Zagor. (Europe, America, part of Asia and Africa), and 5) subsp. *japonicus* Zagor. (Japanese islands and Sea of Japan coast). Such studies, divorced from the literature, are of little value.

Many authors describe or record plants with yellow or yellowish petals. In 1916, Hoffmann (Plant. Umbell. Gen. ed. I, p. 63 et 204), noting the yellow-colored form of *D. carota*, recognized variety *caucasicus* Hoffm., distinguished by yellowish petals (and fruits). In 1851 Bunge described *D. bactrianus* Bge. from near Samarkand, again mentioning the yellow petals. But Bunge had available only 1 specimen collected in the late fall. Yu. Voronov (Fl. Yugo-Vostoka (vol. V, p. 838) (1931)) mentions a specimen from near Stepnoe with golden yellow petals and yellow rays and pedicels. In 1940 Kotov (l. c.) described *D. australis* Kotov from specimens with yellow petals and yellow rays and pedicels collected in the Ukraine. In

1948 Korovin (l. c.) also describes the plant with yellow petals from Pamir-Alai. Ail considered, the color yellow is observed nearly throughout the entire distribution area of *D. carota* in the USSR. Yellow-colored forms have also been observed in W. Europe. There are many specimens of the yellow *D. carota* in the herbarium of the Botanical Institute of the Academy of Sciences of the USSR, collected in different parts of the country. In some cases the petals may have turned yellow in the process of drying, as noted by Rubashevskaya, often even in the umbel rays and pedicels. We have never seen this particular form in nature. The subject requires further study before the yellow-colored forms are given specific status.

2. *D. sativus* (Hoffm.) Roehl. Deutschl. Fl. II (1812) 213; Mart. Pradr. Fl. Mosq. (1817) 56; Zagorodskikh in Dokl. Akad. Nauk. XXV, No. 6 (1939) 525. — *D. carota* L. (β . et γ .) Sp. pl. (1753) 242. — *D. esculentus* Salisb. Prodr. (1796) nom. nud. — *D. carota* var. *sativa* Hoffm. Deutschl. Fl. ed. 1 (1791) 91. — *D. carota* (subsp.) *b. sativus* Hayek, Flora von Steiermark (1910) 1199. — *Carota sativa* Rupr. Fl. ingr. (1860) 468.

Biennial; similar to the preceding species but root thick, fleshy, sometimes to 25–30 cm in circumference, edible, usually colored. June–July. Carrots are cultivated nearly throughout the world as a vegetable and fodder. In the USSR the early-ripening variety is successfully grown beyond the Arctic circle.

Economic importance. A native of the Mediterranean area, the carrot seems to have developed as a cross of *D. maximus* Desf. and *D. carota* L. Its roots were eaten by man as far back as 2,000 years B. C.; its seeds were discovered in lake dwellings in Switzerland. The plant has been described by both Theophrastus and Dioscorides; in Herculaneum it is engraved on a wall. Ancient Arab writers called it "gitsar," a name applied to plants with yellow or red roots. Its cultivation was already widespread in medieval Europe.

Carrots are eaten as a vegetable. The root yields 1.07% of nitrogenous substances, 0.21% fat, 1.28% sugar, 6.59% other carbohydrates, 0.98% cellulose, and 0.73% ash. It is used raw and in the preparation of soups, sauces, canned fish and vegetable products. Cultivated carrots vary widely. Alefeld (Landwirtschaftliche Flora (1866) 101–102) divides the cultivated varieties into 2 groups — α . *longus* Alef., with a long, fusiform root with attenuate tip (3 varieties — *albus*, *sulfureus*, *aurantius*) and β . *curtus* Alef., with a short, obtuse, sometimes subspherical root (4 varieties — *pellucidus*, *saalfeldensis*, *hollandicus*, *violaceus*). Many other varieties have been described and named after the locality where they were grown. Fodder carrots with juicy roots are often cultivated (white, green-headed, Lobberich and others), but their tops are only reluctantly eaten by cattle.

The roots contain 15.5–62.7 (sometimes to 93.3) gammas ($1/1,000,000$ g) of carotene (provitamin A), and 192.5 gammas when vacuum dried. The predominant carotene is the active β carotene. In the leaves there are 140 gammas, declining in the fall. The crushed vegetables yield a juice with only $1/4$ or $1/2$ this amount of carotene. During preparation as food about half of the carotene is lost. Besides carotene the roots contain

1.2–16 gammas vitamin B₁ and 0.2 gammas of vitamin B₂ (the tops contain 4 to 6 times as much vitamin B₂). The roots contain 11.4, the tops 190–254 gammas vitamin C. Distillation of the fruits yields about 0.9% essential oil containing d-pinene, 1-limonene, the spirit daucol, etc.

SUPPLEMENT

Genus 1030a. **SCAPHOSPERMUM** * Korov.

Korov. gen. nov. in Addenda XVI, 358

Flowers bisexual or polygamous; calyx-teeth indistinct; petals yellowish, with inward curved lobule; stylopodium short, conical; style recurved, longer than stylopodium. Fruit ovoid, ribs of mericarps equal, with winglike protrusion, canals solitary in valliculae, 2 canals at commissure; albumen flat toward commissure. Perennial plants, with 2–3 pinnatifid leaves clustered in lower part.

Monotypic genus, known from the north of Tadzhik SSR (Farkak range).

1. *S. asiaticum* Korov. in Addenda, 1. c.

Perennial; root vertical or ascending, 0.8 cm thick, its neck densely covered with fibrous, dark brown remnants of leaves; stems 50–100 cm high, usually single, glabrous, thinly ribbed, hollow, branching; radical leaves soon wilting, 2–3-pinnate, broadly ovate, with short petioles abruptly expanding
293 into amplexicaul sheath with broad scarious margin, 15–25 cm long, 10–15 cm wide, lower primary lobes long-petioluled, the median short-petioluled, upper sessile, oblong, in turn pinnatisect into ovate, sessile or subsessile, pinnatifid into oblong lobules, 10–15 mm long, 5–10 mm wide with few obtuse or acute teeth; cauline leaves few, similar to the radical but smaller, uppermost leaves reduced to oblong sheaths. Umbels 6–9 cm across, of 6–8 smooth rays; involucre and involucels lacking; umbellets ca. 1 cm across, 15–20-flowered; calyx-teeth indistinct; petals yellowish, ca. 1 mm long, ovate, notched, with inward curved tip; fruit 6–7 mm long, 4 mm wide. Fl. June, Fr. August.

Stony slopes, 1,600–2,400 m. — Centr. Asia: Pam.-Al. Endemic. Described from S. Tadzhikistan. Type in Leningrad.

Genus 1062a. **PILOPLEURA** ** Schischk.

Schischk. gen. nov. in Addenda XVI, 358

Calyx-teeth lanceolate, acute; petals whitish, subrounded, short-haired outside; fruit ovoid, dorsally compressed, pubescent, mericarps with 3 protruding dorsal ribs, marginal ribs narrowly winged, appressed, one canal per vallicula, 2 toward commissure.

* From the Greek scaphē — hollow, pit; sperma — seed.

** From the Greek pilos — hair, pleura — rib.

Perennial, with coriaceous, nearly bipinnate, short-scabrous-hairy leaves, involucre and involucels numerous.

Monotypic genus, known from W. Tien Shan.

1. *P. kozo-poljanskii* Schischk. nom. nov. — *Peucedanum dasycarpum* Rgl. et Schmalh. in Tr. Bot. Sada, V, 1 (1877) 254, non Torr. et Gray (1840). — *Zosimia dasycarpa* Korov. in Bot. Mat. Gerb. Bot. Sada, V (1924) 82. — *Z. tordyloides* Korov. l. c. ex parte.

Perennial; root thick, to 1.5 cm across, its neck covered with dark brown fibrous remnants of leaves; stem 70–120 cm high, cylindrical, hollow, shallowly furrowed, erect, finely velutinous-hairy, slightly branching above, about 1 cm thick at base; radical leaves narrowly ovate or oblong, their petioles shorter than blade, abruptly expanded into sheath, blade 7–15 cm long, 4–12 cm wide, bipinnate or nearly simple-pinnate, short-scabrous-hairy on both surfaces, especially along nerves; primary lobes broadly ovate, the lower short-petioluled, the upper sessile, in turn pinnatifid into
294 ovate, unequally largely and acutely toothed lobules or primary lobes nearly entire, with 1–3 unequally acutely toothed sections; cauline leaves smaller, with oblong amplexicaul sheath. Main umbel 10–12 cm across, of 30–36 nearly equal rays covered with short dense stiff hairs; involucre of 11–15 lanceolate, acuminate, short-haired, recurved leaflets $\frac{1}{2}$ to $\frac{1}{3}$ length of rays; umbellets 1.5–2 cm across, many-flowered, with densely hairy pedicels; involucels of 11–13 lanceolate, densely hairy leaflets with dilated scarious margin, as long as umbellets; calyx-teeth lanceolate, acute, half length of petals; petals whitish, subrounded, 1.5 mm long, short-haired outside, tapering to short claw with inward curved tip; ovary densely white-villous; fruit ovoid, dorsally compressed, 4 mm long, 3 mm wide.

Rocky and stony slopes, 3,600 m. — Centr. Asia: T. Sh. (Talas, Kirghiz and Fergana ranges). Endemic. Described from the Karakol River valley. Type in Leningrad.

Key to Genera of Umbelliferae Based on External Characters

1. Stems creeping, leaves rounded-peltate or reniform-triangular, crenate, with free stipules; fruit without carpophore 2.
- + Stems not creeping, leaves never peltate or reniform-triangular, without free stipules; carpophore commonly free, rarely adnate to fruit 3.
2. Mericarps 5-ribbed, marginal ribs appressed, encircling commissure 939. *Hydrocotyle* L.
- + Mericarps 7–9-ribbed, marginal ribs slightly divergent from plane of commissure 940. *Centella* L.
3. Flowers in dense capitula; large calyx-teeth and leaflets of involucre prickly-acuminate or spinous; petals blue or white; fruit covered with scales 944. *Eryngium* L.
- + Flowers in compound, rarely simple umbel, very rarely in capitula; calyx-teeth and leaflets of involucre not spinous; petals white, red, purple, yellow or greenish 4.

4. Leaves entire, ovate to linear. 5.
- + Leaves lobate, palmatipartite, ternately or pinnately dissected, rarely entire, dentate 6.
5. Plant nearly acaulescent; flowers in capitate inflorescence at root-neck, nearly completely concealed by sheaths of radical leaves when young; stylopodium distinctly stalked; petals white, very small (0.5 mm long); leaves linear, entire (E. and S. Transc.) 987. *Hohenackeria* Fisch. et Mey.
- 295 + Plant with developed stem; inflorescence a compact umbel, petals usually yellow 988. *Bupleurum* L.
6. Median flowers of umbellet sessile, bisexual, surrounded by pediceled, staminate flowers, hidden in a kind of pitcher formed by fused bases of pedicels bearing staminate flowers 945. *Echinophora* L.
- + Flowers in terminal umbels bisexual or unisexual (sometimes dioecious), bisexual flowers never hidden in envelope 7.
7. Stylopodium annular or lacking, leaves palmately or ternately parted, serrate, cauline few 8.
- + Stylopodium conical or pulviniform, leaves different, if palmate (very rarely) then stylopodium not annular 11.
8. Stylopodium lacking, base of styles slightly thickened; leaves ternate, with obovate, cuneately tapering leaflets; calyx-teeth indistinct (Caucasus) 1003. *Cryptotaenia* DC.
- + Stylopodium annular; leaves palmatipartite, serrate; calyx-teeth large, acute. 9.
9. Umbels compound, of 3-4 rays, involucre lacking, umbellets in globular heads; fruit subglobular, bearing hamate bristles 941. *Sanicula* L.
- + Umbels simple, surrounded by large, sometimes colored involucre leaflets; fruit oblong, with plicate ribs 10.
10. Terminal umbels long-peduncled; pedicels longer than colored involucre leaflets; perennials 942. *Astrantia* L.
- + Umbels sessile in bifurcations of stem; flowers polygamous, central flowers in umbel bisexual, subsessile, others staminate, on long pedicels; involucre leaflets large, 5-8, twice as long as umbel; calyx-teeth trifid, with prickly tip (Caucasus) 943. *Actinolema* Fenzl.
11. Annuals, with thin root 12.
- + Perennials, with thick root or rhizome, or biennials with fusiform root 41.
- 296 12. Mericarps tapering toward commissure, producing geminate fruit, some mericarps subglobular 969. *Bifora* Hoffm.
- + Fruit not geminate. 13.
13. Involucre and involucels lacking (rarely involucels of 1-3 filiform leaflets); lower cauline leaves entire, rounded or trilobate; short-haired plants 14.
- + Involucre and involucels or only involucels present; lower leaves simple or repeatedly pinnate or ternate. 15.

14. Fruit glabrous, pyriformly attenuate above, styles shorter than stylopodium, petals with ciliate margin, lower leaves entire 1015. *Anisum* Gaertn.
- + Fruit densely hairy, subglobular, styles filiform, several times as long as stylopodium, petals with glabrous margin, lower leaves 3-lobed 1014. *Pimpinella* L.
15. All leaves simple-pinnate, with oblong or orbicular-ovate toothed lobes 16.
- + Leaves bi- or tripinnate or ternately dissected or ternate, lower sometimes entire. 18.
16. Stem with short bristly hairs at nodes and in lower part, in addition to remote longer hairs; leaf lobes rounded-ovate, cordate or rounded at base; leaflets of involucre and involucels without broad scarious margin 1076. *Tordylium* L.
- + Stem and leaves with short dense pubescence, in addition to long bristles tipped with curved spines; leaf lobes oblong, cuneately tapering at base 17.
17. Umbels of 5-15 rays, leaflets of involucre and involucels almost entirely scarious; petals white, peripheral elongating, 3-12 mm long; mericarps with winglike denticulate primary ribs 962. *Lisaea* Poiss.
- + Umbels of 3-5 rays, leaflets of involucre and involucels scarious only along margins; petals purple or pink, rarely white, not exceeding 3 mm; mericarps with protruding primary and secondary ribs bearing 2-3 rows of scabrous spines 961. *Turgenia* Hoffm.
18. Ovary and fruit covered with simple or capitate hairs or with spines 19.
- + Ovary and fruit glabrous, fruit smooth or verrucose, inflated or plicate but not hairy or prickly 29.
19. Involucre and involucels longer than short rays of umbel and umbellets, leaflets of involucre often tripartite or pinnate 20.
- + Involucre and involucels, if present, shorter than rays of umbel and umbellets 21.
- 97 20. Fruit cylindrical, with long flat beak; calyx-teeth indistinct 953. *Scandix* L.
- + Fruit oblong-cylindrical (6 mm long, 1.5 mm wide), beakless, crowned by subulate calyx-teeth 996. *Cuminum* L.
21. Fruit abruptly passing into distinct, more or less long beak 22.
- + Fruit beakless 23.
22. Beak longer than or as long as fertile part, involucre and involucels present 953. *Scandix* L.
- + Beak cylindrical, shorter than fertile part, involucre lacking 952. *Anthriscus* Pers.
23. Fruit densely covered with short or long spreading, simple or capitate hairs 24.
- + Fruit covered with appressed or antrorse bristles or spines 26.
24. Hairs on fruit capitate, fruit small, 1-2 mm long 994. *Aphanopleura* Poiss.
- + Hairs on fruit simple, fruit 2.5-5 mm long 25.

25. Fruit finely scabrous-hairy, leaf lobules 2–7 mm long, 0.3–0.5 mm wide 1051. *Cymbocarpum* DC.
 + Fruit with long, spreading hairs; terminal lobules 1–6 cm long. 958. *Psammogeton* Edg.
26. Stems inflated at nodes, calyx-teeth indistinct, styles shorter than stylopodium 946. *Physocaulis* (DC.) Tausch.
 + Stems not inflated at nodes, calyx-teeth triangular-lanceolate, acute or subulate, persistent in fruit; styles longer than stylopodium, ultimately recurved 27.
27. Stems covered with appressed bristles 957. *Torilis* Adans.
 + Stems glabrous or with spreading hairs 28.
28. Involucre of 3–5 leaflets with white-scarious margin 963. *Orlaya* Hoffm.
 + Involucre lacking or of 1 inconspicuous leaflet. 960. *Caucalis* L.
29. Ovary and fruit covered with whitish vesicular papillae or vesicular verrucae, or transversely folded 30.
 + Ovary and fruit smooth or slightly tuberculate 33.
30. Terminal leaf lobes setaceous, 1–5 cm long, fruit transversely folded (Caucasus). 31.
 + Terminal leaf lobes different, fruit covered with vesicular verrucae (mainly Centr. Asia) 32.
- 298 31. Umbels of 5–10 rays; stems glabrous; involucels shorter than umbellets 993. *Szovitsia* Fisch. et Mey.
 + Umbels of 3–5 rays; stems short-scabrous below; involucels 2–3 times as long as umbellets. 1075. *Ormosciadium* Boiss.
32. Calyx-teeth ovate, thickish. Umbels of 6–8 nearly equal rays; pedicels ovoid, ca. 2 mm long, not turning into spines after abscission of fruit 1002. *Trachyspermum* Link.
 + Calyx-teeth indistinct; umbels of 5–15 extremely unequal rays; fruit rounded-flattened, 3.5 mm long, 4 mm across; pedicels, especially of peripheral flowers, turning into spines after abscission of fruit. 981. *Eremodaucus* Bge.
33. Petals egg-yellow, mericarps with narrowly winged margin. 1064. *Anethum* L.
 + Petals white, purple or pale yellow, mericarps without winged margin. 34.
34. Leaflets of involucre and involucels 3–5-or multipartite into linear or linear-setaceous lobules 1004. *Ammi* L.
 + Leaflets of involucels always entire, those of involucre usually entire, rarely pinnate 35.
35. Involucre always present 36.
 + Involucre absent 38.
36. Stem pubescent, involucre of numerous upright leaflets 1031. *Cnidium* L.
 + Stem glabrous, involucre of 5–9, usually recurved leaflets 37.
37. Petals yellowish; plant to 100 cm high; lower cauline leaves large, 35 cm long, 20 cm wide 973. *Smyrniopsis* Boiss.
 + Petals white or pink; plant 10–40 cm high; lower cauline leaves 1.5–5 cm long, 1.5–3.5 cm wide. 1051. *Cymbocarpum* DC.

38. Fruit cylindrical, beaked 952. *Anthriscus* Pers.
+ Fruit ovoid, without beak 39.
39. Stems covered in lower half with spreading, retrorse or stiff
hairs; leaflets of involucels villous 949. *Sphallerocarpus* Bess.
+ Stems and leaflets of involucels glabrous 40.
- 299 40. Calyx-teeth conspicuous, unequal, elongating in fruit; fruit of
2 hemispherical mericarps with slightly elevated, flexuose primary
and secondary ribs; umbels of 3-5 rays 964. *Coriandrum* L.
+ Calyx-teeth inconspicuous; umbels of 7-18 rays; involucels of
3 leaflets turned to one side, often exceeding umbel; umbel rays
unequal; fruit globular-ovoid, with thick ribs 1027. *Aethusa* L.
41. Involucre and involucels lacking, rarely involucels of 1-2
deciduous leaflets 42.
+ Involucre and involucels or only involucels present 70.
42. Petals yellow or greenish yellow 43.
+ Petals white, pink or purple 53.
43. Upper cauline leaves entire, sessile, amplexicaul, deeply notched
at base 972. *Smyrnum* L.
+ Upper cauline leaves variously dissected or reduced to sheath 44.
44. Mericarps asymmetrical, one with 3, the other with 4 primary
ribs 1057. *Komarovia* Korov.
+ Mericarp symmetrical, number of ribs equal 45.
45. All umbels simple (umbellets), together forming paniculate
inflorescence (Centr. Asia and Transcaucasia) 1059. *Dorema* Don.
+ Umbels compound 46.
46. Flowers polygamous, only terminal umbel fertile 47.
+ Flowers bisexual, rarely few flowers staminate 49.
47. Calyx-teeth subulate, petals brownish yellow, hairy outside
. 1054. *Ladyginia* Lipsky.
+ Calyx-teeth triangular-ovate, often inconspicuous; petals yellow
or greenish yellow, usually glabrous outside 48.
48. Mericarps downy-tomentose toward commissure
. 1055. *Eriosynaphe* DC.
+ Mericarps glabrous toward commissure 1052. *Ferula* L.
49. Terminal lobes thin, filiform, entire, 10-30 mm long, 0.2-0.3 mm
wide. Cultivated biennials 1029. *Foeniculum* Mill.
+ Terminal leaf lobes more or less broad, not filiform. Perennials 50.
50. Umbel rays glabrous (Centr. Asia) 51.
+ Umbel rays more or less pubescent 52.
51. Umbel rays 7-12 1062. *Peucedanum* L.
+ Umbel rays 6-8 1030a. *Scaphospermum* Korov.
- ++ Umbel rays 3-7 1030. *Silaus* Bernh.
52. At least lower part of plant covered with very short velutinous
hairs. Umbels of 3-8 rays 1016. *Reutera* Boiss.
- 00 + Plant with more or less long spreading hairs or subglabrous;
umbels of 5-20 rays 1067. *Pastinaca* L.
- 53(43) Acaulescent plants with thick root, with bundles of leaves and
umbellet rays produced from its neck, carpophores not developed,
fruit not separating into mericarps (high-mountain Caucasian
plant) 1068. *Symphyloma* C. A. M.

- + Plant with developed stem, carpophore usually present, mericarps separating 54.
54. Radical leaves entire or 3-lobed (Caucasus) 55.
- + Radical leaves pinnatipartite or ternately dissected 56.
55. Radical and lower cauline leaves rounded, crenate or shallowly lobed, the lower with long, the upper with short petioles; umbels of 8–16 rays 1017. *Albovia* Schischk.
- + Radical and lower cauline leaves subcoriaceous, ovate-oblong, with cartilaginous, serriform, dentate margin; umbels of 5–8 rays 1005. *Falcaria* Bernh. (*F. falcarioides*).
56. Flowers unisexual, dioecious; leaves cut into thin, linear lobes 989. *Trinia* Hoffm.
- + Flowers bisexual 57.
57. Tubers hidden deep in soil 58.
- + Tubers lacking 59.
58. Mericarps tapering toward commissure, hence fruit geminate, wider than long, carpophore not developed. . 970. *Astomatopsis* Korov.
- + Mericarps not tapering toward commissure, fruit oblong or ovoid, longer than wide, carpophore bipartite 1007. *Bunium* L.
59. Ovary and fruit pubescent or scabrous 60.
- + Ovary and fruit glabrous 63.
60. Peripheral petals elongate 1076. *Tordylium* L.
- + Peripheral petals not elongate 61.
61. Fruit small, ca. 2 mm long, nearly as wide 1014. *Pimpinella* L.
- + Fruit more or less large, flat, 0.5–2 cm long, lateral (sometimes also dorsal) ribs winged 62.
62. Fruit large, 1.2–2 cm long, 1–1.5 cm wide, dorsal ribs narrow, filiform, stylopodium flat, with undulant margin; stem to 1 m high, short-haired, leaves distally appressed-bristly, proximally densely scabrous-hairy 1070. *Stenotaenia* Boiss.
- + Fruit much smaller, dorsal ribs winged, stylopodium conical; stem to 60 cm high, slightly scabrous or subglabrous; leaves scabrous only along nerves and margin 1043. *Chymsydia* Alb.
- 301 63. Leaves bi- or triternate, with ovate, acuminate or acute terminal lobes 64.
- + Leaves simple- or bi- or tripinnate 65.
64. Terminal lobes broadly ovate, obtuse, sometimes subrounded at apex, unequally toothed, often cordate at base, shiny; umbels with glabrous rays; fruit ovoid, 10 mm long, 5 mm wide, with winged dorsal and marginal ribs (Centr. Asia). 1039. *Angelica* L.
- + Terminal leaf lobes ovate, acute, serrate-dentate; umbel rays acutely scabrous distally; fruit ovoid, 2–6 mm long, 1–3 mm wide 1018. *Aegopodium* L.
65. Plants with more or less scabrous-hairy stem or leaves 1014. *Pimpinella* L.
- + Plants glabrous 66.
66. Terminal lobules oblong-linear, 3–7 mm long, 0.3–1.5 mm wide 1006. *Carum* L.
- + Terminal lobules ovate or lanceolate-ovate, 1.5–10 mm wide 67.

67. Stem strongly branching, umbels numerous, on short peduncles, or subsessile; leaves small, ca. 0.5 mm long; cultivated biennials 997. *Apium* L.
 + Stem simple or with few branches, umbels on long peduncles; petals 1 mm long; perennials 68.
68. Leaves simple-pinnate 1037. *Conioselinum* Fisch.
 + Leaves bi- or tripinnate 69.
69. Fruit laterally compressed, marginal ribs not expanding 1018. *Aegopodium* L. (*A. alpestre*).
 + Fruit dorsally compressed, marginal ribs cuneately expanding 1062. *Peucedanum* L.
- 70(41) Involucre lacking or of 1-3 caducous leaflets 71.
 + Involucre of 3 to many leaflets 138.
71. Stem, lower side of leaves and umbel rays covered densely, nearly tomentosely, with many-celled, white, curly hairs; terminal lobules obtuse (Far East) 1046. *Glehnia* F. Schmidt.
 + Plants glabrous or pubescence different 72.
72. Petals yellow or yellowish-greenish 73.
 + Petals white or pink 87.
73. All umbels simple, umbellets many, forming paniculate inflorescence (Centr. Asia and Caucasus) 74.
 + Umbels compound 75.
74. Leaf lobules entire 1059. *Dorema* Don.
 + Lobules serrate 1052. *Ferula* L.
75. Flowers usually polygamous — the bisexual in larger umbels terminating stem and main branches, the staminate on opposite or whorled branches below fertile umbels or exceeding them 76.
 + Flowers bisexual 78.
76. Mericarps densely hairy at commissure. . . 1056. *Schumannia* Kuntze.
 + Mericarps glabrous at commissure 77.
77. Calyx-teeth distinct, flowers subsessile and thus umbels subcapitate, surrounded by leaflets of involucels, densely covered with short white bristles 1053. *Soranthus* Ldb.
 + Calyx-teeth indistinct, flowers on more or less long pedicels, leaflets of involucels without bristles 1052. *Ferula* L.
78. Root tuberiform 1011. *Muretia* Boiss.
 + Root developed as taproot or rhizome 79.
79. Branches whorled; dorsal ribs of mericarps winged (Caucasus) 1044. *Xanthogalum* Lalle.
 + Stem with alternate branches, dorsal ribs filiform 80.
80. Biennials, fruit ovoid, slightly geminate, 2 mm long (known only in cultivation) 999. *Petroselinum* Hoffm.
 + Perennials, fruit oblong-oval, slightly compressed laterally or flattened dorsally, 3.5-5 mm long (wild plant) 81.
81. Fruit oblong-ovoid, slightly compressed laterally 82.
 + Fruit compressed dorsally, more or less flat 83.
82. Mericarps with 5 winged ribs 1030. *Silaus* Bess.
 + Mericarps with 5 acute, markedly protruding but not winged ribs (Pam.-Al.) 1030a. *Scaphospermum* Korov.

- ++ Mericarps with slightly protruding ribs 1024. *Seseli* L.
83. Commissural canals usually broad, distally clavate, not extending to base of mericarp; leaves large, simple-pinnate 1069. *Heracleum* L.
- 303 + Commissural canals never clavate, extending to end of mericarp 84.
84. Plants more or less pubescent 85.
- + Plants completely glabrous 86.
85. Mericarps with slightly inflated margins 1071. *Malabaila* Hoffm.
- + Mericarps with thin margins, not inflated 1067. *Pastinaca* L.
86. Marginal ribs of mericarps expanded, hence fruit rimmed 1062. *Peucedanum* L.
- + Marginal ribs not expanded (S. Transcaucasia) 1048. *Johrenia* DC.
- 87(72) Plant with single superficial or deeply hidden tuber 88.
- + Plant without tuber, or with bundle of distally tuberiform roots 93.
88. Tuber deeply hidden in soil 89.
- + Tuber superficial 91.
89. Peripheral petals elongate, twice as long as the internal; valliculae covered with verrucae, sometimes with papillae or bristles 956. *Albertia* Rgl. et Schmalh.
- + Peripheral petals not enlarged, fruit glabrous, smooth 90.
90. Fruit geminate, mericarps curved, tapering toward commissure, carpophore not developed 970. *Astomatopsis* Korov.
- + Fruit not tapering toward commissure, not geminate, carpophore 2-partite 1007. *Bunium* L.
91. Entire plant glabrous, terminal lobules lanceolate 1010. *Seselopsis* Schischk.
- + Plant covered in lower part, sometimes nearly to top, with white stiffish, retrorse or spreading hairs; terminal lobules linear or lanceolate-linear 92.
92. Fruit pyriform, tuberculate, attenuate above 948. *Krasnovia* M. Pop.
- + Fruit cylindrical, with flat ribs, not attenuate above 947. *Chaerophyllum* L.
- 93(87) Secondary ribs with 1 or 2 rows of setaceous spines expanding or connate at base; peripheral petals 2-4 times as long as the internal 959. *Astrodaucus* Drude.
- + Fruit glabrous or pubescent, without large spines 94.
94. Ovary, usually also fruit, transversely folded or bearing whitish, spongy excrescences 95.
- + Ovary and fruit covered with hairs or bristles or completely glabrous 97.
95. Ovary covered with dense transverse folds, these in ripe fruit nearly obliterated or persistent as transverse excrescences (E. Siberia and Far East) 1050. *Saposhnikovia* Schischk.
- 304 + Primary ribs of fruit with white, spongy tissue; plants often dioecious 96.
96. Fruit subglobular; dioecious plants, with narrow linear, long (1-3 cm), terminal lobules (Crim.) 990. *Rumia* Hoffm.
- + Fruit ovoid; perennials, with short (2-12 mm) terminal lobules (W. Siberia) 991. *Ledebouriella* Wolff.

97. Ovary and fruit covered with hairs or bristles, these often sessile on tubercles 98.
 + Ovary and fruit smooth, glabrous 105.
98. Fruit large, 10–12 mm long, ovoid, along ribs with excrescences with broadened base and hamately curved tip (Caucasus). 982. *Lecokia* DC.
 + Fruit without hamate excrescences, covered with bristles, these sometimes sessile on tubercles or fruit pubescent or tuberculate 99.
99. Fruit 18–25 mm long. 100.
 + Fruit to 10 mm long 101.
100. Umbels of 3–8 glabrous rays, leaflets of involucels lanceolate-linear, herbaceous, glabrous, peripheral petals not elongate 954. *Osmorrhiza* Rafin.
 + Umbels of 8–10 pubescent rays; leaflets of involucels lanceolate, nearly entirely scarious, peripheral petals elongate (3 mm) 955. *Myrris* L.
101. Fruit tapering to short or longer beak, ribs indistinct, shiny, sometimes covered with tubercles or bristles, often with basal crown of white bristles 952. *Anthriscus* Pers.
 + Fruit pubescent, without beak or crown of bristles, ribs more or less protruding 102.
102. Fruit subsessile, carpophore not developed. 1025. *Sphenocarpus* Korov.
 + Fruit distinctly stalked, carpophore bipartite 103.
103. Fruit globular, small, styles divergent, as long as fruit (*S. Transcaucasia*) 1014. *Pimpinella* L. (*P. ramosa*).
 + Fruit oblong or ovoid-oblong 104.
104. Calyx-teeth subulate, deciduous in fruit 1023. *Libanotis* L.
 + Calyx-teeth short, persistent in fruit 1024. *Seseli* L.
105. Involucels of very small, 1–2 mm long, whitish, lanceolate, indistinct, caducous leaflets; leaves thrice ternate; terminal lobules nearly rounded, 5–10 cm long, 4–8 cm wide 1061. *Laser* Borkh.
 + Involucels of larger leaflets, usually persistent in fruit; leaves bi- or tripinnate, leaflets usually not rounded 106.
106. Dioecious plants; leaves usually dissected into filiform lobules 989. *Trinia* Hoffm.
 + Plants bisexual or heterogeneous, never dioecious 107.
107. Fruit geminate, of 2 subglobular mericarps (Centr. Asia) 108.
 + Fruit not geminate 109.
108. Stylopodium sunk between 2 mericarps. 985. *Cryptodiscus* Schrenk.
 + Stylopodium raised above fruit 968. *Schrenkia* Fisch. et Mey.
109. Umbels of 1–4 rays, involucels of ovate, nearly entirely scarious, 10–12 mm long, 8–10 mm wide leaflets, as long as umbellet rays; leaves simple-pinnate (Centr. Asia). 977. *Hymenolaena* DC.
 + Umbels of 5–80 rays, involucels different, usually shorter than rays 110.
110. Leaves geniculately curved below, generally broadly triangular, with divaricate lobes, not in 1 plane. 111.

- + Leaves not geniculately curved, lobes in 1 plane 115.
- 111. Calyx-teeth rather long, subulate, terminal lobules short
(3—8 mm); shore plants 1026. *Oenanthe* L.
- + Calyx-teeth indistinct or very short, not subulate, terminal
lobules large (1.5—8 cm long) 112.
- 112. Sheaths, particularly in upper leaves, large, more or less
inflated, terminal lobules ovate, 4—11 cm long, 1—5 cm wide 113.
- + Sheaths cylindrical, terminal lobules linear or subfiliform
(1.5—6 cm long, 0.5—5 mm wide) 114.
- 113. Main umbel of 40—80 scabrous-hairy rays; pedicels scabrous-
hairy below umbels 1039. *Angelica* L. (*A. refracta*).
- + Main umbel of 8—30 smooth rays, slightly scabrous only at apex;
pedicels glabrous under umbels 1038. *Ostericum* Hoffm.
- 306 114. Stems branching, umbels of 10—20 rays, terminal lobules 1—5 mm
wide, fruit ovoid, nearly not compressed. 1036. *Cenolophium* Koch.
- + Stems usually simple, with 1 umbel, or slightly branching, like
sheaths, purple-violet in upper part; fruit plano-compressed
dorsally 1062. *Peucedanum* L. (*P. salinum*).
- 115(110). Fruit cylindrical, not more than 3 times as long as wide;
leaflets of involucels ovate, acuminate, nearly entirely scarious,
often with ciliate margin 116.
- + Fruit ovoid, not more than twice as long as wide, or fruit
globular 117.
- 116. Fruit obscurely ribbed, often shiny, tapering to short beak,
base of ovary and fruit often covered with white bristles.
. 952. *Anthriscus* (Hoffm.) Pers.
- + Fruit without beak, with obtuse ribs and narrow valleculae between
ribs, base of ovary and fruit without white bristles.
. 947. *Chaerophyllum* L.
- 117. Calyx-teeth large, often enlarged in fruit 118.
- + Calyx-teeth inconspicuous, often lacking. 121.
- 118. Water or bog plants, their creeping rhizome divided by septa
into hollow chambers, or with reduced vertical rhizome bearing
cordlike roots, these sometimes terminated by tuberiform
thickening 119.
- + Plants of arid habitats, with thick, vertical or ascending root . . 120.
- 119. Rhizome thick, short-cylindrical, divided by transverse septa
into chambers; fruit 2—2.5 mm long; carpophore bipartite
. 1001. *Cicuta* L.
- + Root vertical, without transverse septa; fruit 3—4 mm long;
carpophore lacking. 1026. *Oenanthe* L.
- 120. Calyx-teeth hardening in fruit. 965. *Stschurowskia* Rgl. et Schmalh.
- + Calyx-teeth soft in fruit 966. *Kosopoljanskia* Korov.
- 121. Petals bright red or purple 122.
- + Petals white, rarely pink, or greenish-whitish 124.
- 122. Stem 40—80 cm high; leaflets of involucels subulate (Caucasus)
. 987. *Eleutherospermum* C. Koch.
- + Stem 8—40 cm; leaflets of involucels lanceolate 123.
- 123. Umbels of 7—10 nearly equal rays; involucels of 5 lanceolate
leaflets with scarious margin (Carpathians).
. 1034. *Ligusticum* L. (*L. mutellina*).

- 307 + Umbels of 5-7, very unequal rays; leaflets of involucels linear (Centr. Asia) 1006. *Carum* L. (*C. atrosanguineum*).
124. Umbels numerous, on short peduncles, sometimes sessile. Water or bog plants 998. *Helosciadium* Koch.
- + Umbels on more or less long pedicels, never sessile 125.
125. Fruit with distinct winged ribs, marginal wings often wider than the dorsal 126.
- + Fruit with filiform or protruding, not winged ribs 131.
126. Marginal wings distinctly wider than the dorsal, fruit flattened dorsally 1037. *Conioselinum* Fisch.
- + Marginal and dorsal wings nearly equal, fruit compressed laterally 127.
127. Stem deeply furrowed, with winged ribs 1032. *Selinum* L.
- + Stem ribbed, not winged 128.
128. Rays of umbels and umbellets glabrous, rays of umbel abruptly antrorse, thus umbel narrowly obconical 1034. *Ligusticum* L. (*L. mongholicum*).
- + Rays of umbels and umbellets at least scabrous above, umbels with hollow, antrorse rays 129.
129. Sheaths of upper leaves nearly cylindrical, not inflated 1031. *Cnidium* Cuss.
- + Sheaths of upper leaves markedly inflated, ovate 130.
130. Stems with whorled branches, lobules decurrent, scabrous along nerves on both sides, fruit 8-10 mm long, 5 mm wide (Caucasus) 1042. *Agasyllis* Spreng.
- + Stem simple or with alternate branches, terminal lobules obscurely cordate at base, not decurrent, fruit 5 mm long, 3 mm wide (E. Siberia and Far East) 1041. *Coelopleurum* Ldb.
131. Fruit markedly compressed dorsally, with expanded marginal wings 132.
- + Fruit slightly compressed laterally 135.
132. Commissural canals not extending to base of mericarp, usually with clavate tip; peripheral petals usually enlarged 1069. *Heracleum* L.
- + Commissural canals extending to base of mericarps, never clavate, peripheral petals not enlarged 133.
- 308 133. Marginal wings of mericarps densely overlapping 1062. *Peucedanum* L.
- + Marginal wings different, thus mericarps gaping 134.
134. Umbels spherical, with retrorse marginal rays, leaflets ovate, with large obtuse teeth; uppermost internode of stem glabrous or hairy near base of umbels 1040. *Archangelica* Hoffm.
- + Umbels semispherical, marginal rays antrorse, leaflets oblong-ovate or lanceolate, finely and acutely toothed; upper internodes of stem (under peduncle) short-haired (rarely glabrous) for a significant distance from base of umbel 1039. *Angelica* L.
135. Calyx-teeth inconspicuous 1006. *Carum* L.
- + Calyx-teeth conspicuous, persistent or abscissing in fruit 136.
136. Styles erect, half as long as fruit 1023. *Libanotis* L. (*L. dolichostyla*).

- + Styles recurved, shorter 137.
- 137. Calyx-teeth abscissing in fruit 1023. *Libanotis* L.
- + Calyx-teeth persistent even in fruit 1024. *Seseli* L.
- 138(70) Plant acaulescent or with very short procumbent stem.
- High mountain plants 139.
- + Plant with more or less developed, erect, usually leafy, rarely leafless stem 142.
- 139. Entire plant densely covered with rather short hairs, fruit covered with stiff membranes or densely hairy 1022. *Stenocoelium* Ldb.
- + Plant glabrous or subglabrous 140.
- 140. Petals yellowish, umbels often simple (umbellets), produced in large number from base of stem. . . . 1013. *Chamaesciadium* C. A. M.
- + Petals white 141.
- 141. Leaflets of involucre often pinnately or ternately cleft, umbels of 4–7 rays 1006. *Carum* L. (*C. caucasicum*).
- + Leaflets of involucre entire 1035. *Pachypleurum* Ldb. (*P. gayoides*).
- 142. Leaflets of involucre or involucels pinnatisect or ternately dissected into thin, subulate or linear lobes 143.
- + Leaflets of involucre and involucels entire or 3-partite above, not dissected to midrib 147.
- 143. Ovary and fruit covered with spines and bristles, terminal lobules narrowly lanceolate 1079. *Daucus* L.
- 309 + Ovary and fruit without spines or bristles, terminal lobules filiform-linear 144.
- 144. Leaflets of involucels as long as umbel 145.
- + Leaflets of involucels much shorter than umbel. 146.
- 145. Leaflets of involucels bipinnatisect, numerous; plant 26–35 cm high. High mountain perennials 1028. *Schultzia* Spreng.
- + Leaflets of involucre ternate- or simple-pinnate, plant 50–100 cm high, umbels of numerous (to 100) glabrous rays; biennials (Caucasus) 1004. *Ammi* L.
- 146. Fruit with marginal wings 951. *Caropodium* Stapf et Wettst.
- + Fruit not winged 950. *Grammosciadium* DC.
- 147. Root tuberiform 148.
- + Root never tuberiform 155.
- 148. Petals yellow or greenish yellow 149.
- + Petals white 151.
- 149. Fruit dorsally compressed, with whitish expanded marginal ribs. 1065. *Korovinia* Nevski et Vved.
- + Fruit slightly compressed laterally, without expanded rim. 150.
- 150. Mericarps tapering toward commissure, thus fruit geminate 1012. *Korshinskya* Lipsky.
- + Mericarps different 1011. *Muretia* Boiss.
- 151. Fruit covered with transverse folds . . . 992. *Ormopterum* Schischk.
- + Fruit different. 152.
- 152. Mericarps with protruding, winglike, flexuose dorsal ribs 1033. *Hyalolaena* Bge.
- + Dorsal ribs filiform or protruding, not flexuose. 153.

153. Mericarps with winglike expanding marginal ribs 1063. *Oedibasis* K.-Pol.
+ Ribs different 154.
154. Mericarps tapering toward commissure 971. *Scaligeria* DC.
+ Mericarps different 1009. *Hymenolyma* Korov.
155. Mericarps globular or subglobular, strongly tapering toward
commissure, thus fruit sharply geminate 156.
+ Mericarps never globular, not tapering toward commissure or
only slightly tapering, thus fruit obscurely geminate 157.
156. Stylopodium at apex of fruit (desert plants)
..... 968. *Schrenkia* Fisch. et Mey.
- 310 + Stylopodium hidden in upper part of commissure (plant grows in
sands) 985. *Cryptodiscus* Schrenk.
157. Petals yellow, whitish-yellowish or yellowish-greenish 158.
+ Petals white, pink, red or whitish-greenish 172.
158. Fruit hardly compressed dorsally, rounded-globular or oblong. . . 159.
+ Fruit dorsally compressed, often flat. 165.
159. Ovary and fruit glabrous or covered with white, verrucose
excrecences 160.
+ Ovary and fruit more or less pubescent 1078. *Laserpitium* L.
160. Fruit with short, white, verrucose outgrowths 161.
+ Fruit glabrous, without white verrucae 162.
161. Fruit with winged dorsal ribs 979. *Aulacospermum* Ldb.
+ Fruit with acute, not winglike dorsal ribs . . . 980. *Trachydium* Lindl.
162. Ribs of fruit thick, flexuosity tuberculate
..... 983. *Hippomarathrum* Hoffm. et Link.
+ Ribs of fruit never thick or tuberculate 163.
163. Fruit small, to 5 mm long rays, umbels unequal 1024. *Seseli* L.
+ Fruit large, rays of umbels nearly equal 164.
164. Fruit circular in cross section, suberous-spongy ribs completely
fused 984. *Cachrys* L.
+ Fruit with 5 band-shaped or broad, thick, suberous-spongy,
protruding ribs 986. *Prangos* Lindl.
165. Mericarps with more or less swollen margins
..... 1071. *Malabaila* Hoffm.
+ Margins different 166.
166. Stem covered in lower half with whitish, retrorse, flattened or
squamate hairs. Umbels of 6-10 glabrous rays
..... 1060. *Opopanax* Koch.
+ Stem glabrous or hairy, without squamate hairs 167.
167. Fruit large, usually ovoid, 6-20 mm long 1058. *Ferulago* Koch.
+ Fruit to 5 mm long, usually globular, rarely ovoid 168.
168. Plants more or less pubescent 1068. *Pastinaca* L.
+ Plants glabrous 169.
169. Leaves thinly dissected, 1-2 mm long, withering at flowering,
with very short lobules 1047. *Palimbia* Bess.
- 311 + Leaves with longer lobules, persistent at flowering. 170.
170. Leaflets of involucre and involucels with finely ciliate margin,
often scabrous above; leaflets of involucre slightly connate;
fruit yellowish brown, the 3 dorsal ribs nearly winglike
..... 1045. *Levisticum* Hill.

- + Leaflets of involucre and involucels glabrous; leaflets of involucels free; fruit whitish or whitish-yellowish, dorsal ribs filiform 171.
- 171. Fruit ovoid or subglobular 1062. *Peucedanum* L.
- + Fruit oblong 1064. *Anethum* L. (*A. involucratum*).
- 172(157) Plants with slightly fleshy (succulent), pale green, ternate-bipinnate leaves with linear-lanceolate or lanceolate (2.5–5 cm long, 5–6 mm wide), slightly spinose lobules (plants of the Black Sea coast) 1021. *Crithmum* L.
- + Leaves not fleshy or spinose 173.
- 173. Nearly all leaves radical; stem leafless or with 1 leaf in lower part; styles recurved, three times as long as stylopodium 974. *Danaa* All.
- + Stems leafy, styles slightly longer or shorter than stylopodium .. 174.
- 174. Fruit with protruding, often winged secondary ribs, these sometimes covered with spines 175.
- + Fruit with filiform or winged primary ribs only 176.
- 175. Primary and secondary ribs undulant-curved; leaflets or involucels ovate or ovate-lanceolate, nearly entirely scarious 1077. *Polylophium* Boiss.
- + Primary and secondary ribs not undulant-curved; involucels of linear, filiform, rarely oblong-linear, sometimes narrowly scarious leaflets 1078. *Laserpitium* L.
- 176. Ovary and fruit glabrous, rarely fruit with few hairs 177.
- + Ovary and fruit pubescent 1062a. *Pilopleura* Schischk.
- 177. Radical leaves entire or ternate, cauline leaves biternate; terminal lobes linear-lanceolate or linear, finely and acutely serrate 1005. *Falcaria* Berth.
- + Leaves simple- or multipinnate or ternately dissected into ovate lobules 178.
- 312 178. Leaves, at least the lower, simple-pinnate, submerged leaves sometimes multisect 179.
- + Leaves biternate or multipinnate 184.
- 179. Calyx-teeth distinct; perennial hydrophilous shore plants 180.
- + Calyx-teeth indistinct; biennials, rarely perennials 181.
- 180. Leaflets of involucre sometimes incised, those of radical leaves ovate or ovate-oblong, obtuse, often with 1 adaxial lobe, biserrate-incised; umbels opposite leaves; fruit ovoid-globular, 1.5–2 mm long, nearly as wide 1020. *Berula* Koch.
- + Leaflets of involucre entire, seldom toothed, leaflets of radical leaves broadly or narrowly lanceolate, acute, serrate bipinnate (submerged leaves sometimes present); fruit ovoid or oblong, 2.5–3.5 mm long 1019. *Sium* L.
- 181. Umbel of 3–6 glabrous rays, umbellets 3–10-flowered (*Caucasus*) 182.
- + Umbels of 6–20 rays scabrous above, umbellets 15–25-flowered 183.
- 182. Umbels of 4–6 rays, involucre and involucels of 2–5 short, linear-subulate leaflets; ripe fruit black 1000. *Sison* L.
- + Umbels of 3–4 rays, involucre and involucels of 3–5 oblong-lanceolate leaflets, with broad scarious margin; ripe fruit not black 995. *Froriepia* Koch.

183. Fruit slightly compressed laterally, marginal wings not expanding (Caucasus) 1006. *Carum* L. (*C. grossheimii*).
 + Fruit compressed dorsally, marginal wings expanding 1062. *Peucedanum* L. (*P. falcaria* Turcz.).
184. Leaves simple- or biternate, primary and secondary lobes on more or less long petiolules; petals greenish-whitish 185.
 + Leaves bi- or multipinnate; petals white or pink 186.
185. Leaves ternate, with large (3–8 cm long, 1–5(7) cm wide) lobules 1034. *Ligusticum* L.
 + Leaves bi- or triternate, with smaller (1–3.5 cm long, 0.3–2.5 cm wide) lobules 1032. *Selinum* L. (*S. tianschanicum*).
- 313 186. Stems 6–40 cm, leafless or with few leaves, umbels rather dense, 2–4 cm across, involucre of nearly equal rays. High mountain and arctic plants 1035. *Pachypleurum* Ldb.
 + Stems higher, 40–150 cm high, usually leafy, rarely with few cauline leaves, umbels 4–12 cm across 187.
187. Involucre of 3–7 recurved, herbaceous leaflets, involucels also of 3–7 leaflets, shifted to one side, proximally connate; stems with reddish-brown spots in lower part; fruit broadly ovoid, with undulant ribs 975. *Conium* L.
 + Involucral leaflets not oblique, if connate then leaflets many; stems without reddish brown spots 188.
188. All ribs thickened, spongy (Siberia) 1049. *Phlojodicarpus* Turcz.
 + Dorsal ribs filiform or winged 189.
189. Fruit markedly compressed dorsally 190.
 + Fruit different 192.
190. Dorsal ribs much protruding, nearly winged 1037. *Conioselinum* Fisch.
 + Dorsal ribs filiform 191.
191. Root thick, cylindrical 1066. *Mogoltavia* Korov.
 + Root fusiform 1062. *Peucedanum* L.
192. Dorsal ribs with narrow or broad wings 193.
 + Dorsal ribs filiform or slightly protruding, sometimes acute, not winged 197.
193. Fruit oblong-cylindrical, dorsal ribs with narrow undulant-curly wings 1033. *Hyalolaena* Bge.
 + Fruit ovoid or subglobular, with broad, usually not undulant wings 194.
194. Upper part of stem, inflorescence, usually also margins and nerves of leaves, beneath or above, short-stiff-hairy or covered with short, papilliform hairs. Large plants, 100–150 cm high. . . 195.
 + Plants glabrous, sometimes scabrous along margins and upper side of nerves 196.
195. Leaflets of involucre herbaceous, large, 1.5–6 cm long, recurved, cleft into teeth; leaves stiff-haired along margins and lower side of nerves 976. *Pleurospermum* Hoffm.
 + Leaflets of involucre up to 1 cm long, often scarious at margins; leaves glabrous above along nerves and margins or covered with very short hairs 1034. *Ligusticum* L.
- 314 196. Umbel rays extremely unequal; ribs winged, often undulant or crenate, valleculae often with whitish verrucae 979. *Aulacospermum* Ldb.

- + Leaflets of involucre equal or nearly so; valleculeae without whitish verrucae, ribs winged, neither undulant nor crenate 1031. *Cnidium* L.
- 197. Terminal lobules setaceous, 3–6 mm long, leaflets of involucre and involucels also setaceous; styles very short (0.5 mm long in fruit) 967. *Fuernrohria* C. Koch.
- + Terminal lobules lanceolate or linear, leaflets of involucre and involucels oblong or linear; styles not less than 1 mm long in fruit 198.
- 198. Fruit with acute ribs; petals whitish-greenish; stems to 100 cm high 978. *Eleutherospermum* C. Koch.
- + Fruit with filiform ribs; petals white or pink 199.
- 199. Stems 4–40 cm high 1006. *Carum* L.
- + Stems 40–100 cm high 200.
- 200. Umbels of 4–8 rays, leaflets of involucre and involucels oblong-lanceolate, with broad scarious margin (Centr. Asia) 1008. *Zeravschania* Korov.
- + Umbels of 8–15 rays, leaflets of involucre and involucels linear (Caucasus) 1014. *Pimpinella* (*P. anthriscoides*).
- 201. Leaves simple-pinnate; high mountain plants, with prostrate stems 1074. *Pastinacopsis* Golosk.
- + Leaves bi- to quadripinnate, rarely simple-pinnate; stems usually erect 202.
- 202. Fruit strongly compressed dorsally, flat 203.
- + Fruit different 205.
- 203. Fruit large, 10–15 mm long, with strongly swollen glabrous border 1072. *Zosimia* Hoffm.
- + Fruit 4–10 mm long, with slightly swollen border 204.
- 204. Fruit without winged border, umbels of 8–30 rays (Siberia) rays white-villous, covered with thin long hairs 1049. *Phlojodicarpus* Turcz.
- + Fruit with narrow border, umbels of 3–15 short-haired or subglabrous rays (Centr. Asia) 1073. *Platytaenia* Nevski et Vved.
- 205. Calyx-teeth caducous, stems angled-ribbed 1023. *Libanotis* L.
- + Calyx-teeth persistent, stems cylindrical 1024. *Seseli* L.

315 Family **NYSSACEAE** ENDL.

Nyssa arctica Heer, Upper Cretaceous, Anadyr, Arctic, in Eocene Kamchatka. — *N. rostrata* Pojark., Danian (Bureya Tsagayanskoye), Bureya Belogor'e, Amur. — *N. cfr. rostrata* Pojark., Lower Eocene, W. Kamchatka (Pereval'nyi spring). — *N. vertumni* Unger, Cenomanian Ayat' River (eastern slope of Urals); Upper Cretaceous, Ob (Simonova, Chulym River). — *N. sp.* in Oligocene Tomsk, Miocene Tara. *Nyssidium ekmani* Heer, Upper Eocene, W. Kamchatka (Pereval'nyi spring). — *N. geminatum* Schmalh., Upper Cretaceous, Arctic. — *N. spicatum* Schmalh., Upper Cretaceous, Arctic. *Berrya apoda* Pojark., Oligocene, W. Kamchatka (Snatol River).

Family CXX. **CORNACEAE** * LINK.

Flowers bisexual or unisexual, dioecious, regular. Calyx of entire or 4-(5)-lobed throat and 4(5) small, rarely short-tuberculate teeth. Petals as many as calyx-teeth, in bud valvate or rolled to the right. Stamens as many as petals, filaments subulate, anthers ellipsoid, usually dorsifix. Disk epigynous, in staminate flowers central. Ovary inferior, 1-4-celled, with simple, rarely bipartite styles, each cell with one drooping, anatropous, inward curved ovule, with one integument and dorsal or ventral suture. Fruit usually a drupe, rarely a berry, exocarp usually fleshy and juicy, endocarp usually stony, rarely cartilaginous; fruit usually 1 drupe, 1-4- rarely 2- or 4-celled. Seeds with membranous coat and large endosperm, embryo small, terminal or longitudinal, cotyledons usually leaf-shaped. Trees or shrubs, rarely semishrubs, with woody creeping stems hidden in ground or moss. Leaves opposite or alternate, simple or dentate, nearly always exstipulate. Flowers small, in cymose, usually compound paniculate or corymbiform, rarely in umbelliferous or capitate inflorescence.

Sixteen genera, mainly in the temperate regions of E. Asia, some extending to the northern part of Eurasia and in N. and C. America. Some species grow in the Indian-Malayan area, S. Africa, Madagascar, S. America, New Zealand and the Fiji Islands.

Most species of Cornaceae belong to *Cornus*, known in the USSR from the Upper Cretaceous (Danian) to the Quaternary.

316 *Mastixia* sp., Upper Cretaceous, Ar.-Casp. (determined by P. I. Dorofeev). *Alangium aequalifolium* (Goepp.) Krysh., Oligocene-Middle Miocene, Urals area; Miocene, Tara; Pliocene, Kireev on the Ob River.

In the USSR, *Cornus* is known since the Paleocene. The characteristic leaves and fruit stones leave no doubt about their correct determination: *Cornus* cf. *hyperborea* Heer, Tertiary Kamchatka, Paleogene, western bank of Kamchatka. — *C. grandiflora* Chachl., Pliocene, Kireevskoe Village on the Ob River. — *C. mas* L, Akchagylsk, Transc. (Shvingel' Range in S. Kakhetia, in Shiraki district). — *C. mugodsharica* Krysh., Paleocene, U. Tob. (Mugodzhary). — *C. orbifera* Heer, Middle Oligocene, Urals area (Sary-Bulak). — *C. rhamnifolia* Weber, Upper Cretaceous, Ob (Simonova on Chulym River). — *C. pojarkovae* Mtschedl., Middle Miocene, Urals area — *C. sanguinea* L., Sarmatian Bl. (Krynka), interglacial U. Dnp. (Samostrel'niki); V.-Kama (Galich). — *C. studeri* Heer, Paleogene Uss. (Amagu) and Sakh. (Mgach, where the deposits involved may be Cretaceous), Oligocene northwest shore of Sakh. (Kadyk-Birakan). — *C. sukaczewii* Pan, Lower Quaternary, V.-Don (near Novokhopersk), L. V. (Raigorod), Mindel-Riss Ob (Semeikin gulley, Vyaskov gulley, Riss-Würm Ob (Semeikin crag). — *Cornus* sp., Paleocene, Amur (Raichikha), Paleogene, Uss. (Rechnoi peninsula), Pliocene, V.-Kama; Upper Pliocene, V.-Don (Voronezh Region, Uryv, Ivnitsy); Mindel-Riss, V.-Don (S. Voronezh Region).

* Treatment by A.I. Poyarkov.

Key to Genera

1. Low plants, herbaceous annual stems bearing a capitate apical inflorescence surrounded by involucre of white, petaloid leaflets and producing woody, horizontal stems hidden in soil or in moss 1081. *Chamaepericlymenum* Graebn.
- + A true shrub or tree. 2.
2. Leaves alternate 3.
- + Leaves opposite 4.
3. Leaves evergreen, dentate; flowers purple, in pyramidal, paniculate inflorescences. Fruit berry-like, red (sometimes yellow or white) ★ *Aucuba* Thbg.
- + Leaves deciduous, entire. Flowers white, in corymbiform inflorescences. Fruit drupe-like, black-blue 1082. *Bothrocaryum* (Koehne) Pojark.
4. Inflorescence without involucre, compound, corymbiform. Fruit black, blue, sky blue or white 1083. *Thelycrania* (Dumort.) Fourr.
- + Inflorescence surrounded by involucre of 4–6 herbaceous or petaloid leaflets, capitate or small, umbellate. Nutlets red, free or concrescent in spherical, alveolate, compound fruit. 5.
5. Flowers yellow, in umbellate inflorescence, with involucre of small, deciduous, herbaceous leaflets. Fruit on stalks 1080. *Cornus* L.
- 317 + Flowers sessile in capitate inflorescence, surrounded by involucre of 4–6(8) large, petaloid leaflets. Fruit free, sessile or concrescent in spherical compound fruit ★ *Cynoxylon* Raf.

Genus 1080. *CORNUS* * L.

L. Sp. pl. (1753) 117, pro parte.—*Cornus* L. *Cornotypus* Dumort. Fl. belg. (1827) 83.—*Cornus* sect. *Tanycrania* Endl. Gen. pl. (1836) 798.—*Eukrania* Raf. Alsogr. Amer. (1838) 59, p.p. quoad typus.—*Cornus* sect. *Macrocarpium* Spach, Hist. vég. phan. VIII (1839) 101.—*Macrocarpium* Nakai in Bot. Mag. Tokyo, XXIII (1909) 38

Trees and shrubs. Inflorescence umbellate, produced from leafless, terminal bundle of short shoots, surrounded by involucre of 4 brown-green, soon deciduous leaflets, forming 4 groups of individual cymose inflorescences with all axes, except the terminal (pedicels), reduced. Calyx of 4 short teeth, petals yellow, ovary broadly obconical; fruit fleshy, red, oblong, rather large, with oblong nutlet.

Four species: *C. mas* L. in southern, central and eastern Europe, Asia Minor, Caucasus and the Crimea; *C. officinalis* S. et Z. in Japan; *C. chinensis* in Central China, and *C. sessilis* Torr. in California.

1. *C. mas* L. Sp. pl. (1753) 117; Mill. Gard. dict. ed. VIII (1768) No. 1; M. B. Fl. taur.-cauc. I, 111; Boiss. Fl. or. II, 273; Shmal'g., Fl. I. 43; Harms in E. u. P. Pflanzenfam. III, 8 (1898) 266; Wanger. in Pflanzenr. IV, 229; Grossg., Fl. Kavk. III, 197; Sanadze in Tr. Tbil. univ. XXIXa, 35.—*C. mascula* L. Syst. nat. ed. X, II (1760) 897; Pall. Fl. Ross. I, 50;

* The Roman name, from the Latin *cornus* — horn, referring to the hardness of the wood.

Lam. Encycl. II, 113; Ldb. Fl. Ross. II, 378; Medved., Der. i kust. Kavk. 174. — *C. vernalis* Salisb. Prodr. (1796) 66. — *C. praecox* Stokes, Bot. Mat. Med. I (1812) 222. — *C. flava* Steud. Nomencl. bot. ed. I (1821) 227, nom. nud. — *C. nudiflora* Dumort. Fl. belg. (1827) 33. — *C. erythrocarpa* St.-Lag. in Bull. Soc. Bot. Fr. XXXI, Bibl. (1884) 201. — *Eukrania mascula* Raf. Alsogr. Amer. (1838) 59. — *Macrocarpium mas* Nakai in Tokyo Bot. Mag. XXIII (1909) 38. — Ic.: Rchb. Ic. fl. Germ. XXIV, tab. 143; C. K. Schn. Laubholzsk. II, f. 299 h-1, 300 a-i; Pflanzenr. IV, 229 (1910) f. 12 c-h; Hegi, III. Fl. V, 2, tab. 204, f. 4,4a, 4b. — Exs.: G. R. F. No. 1022.

Shrub or small tree, 2–5(9) m high, trunk usually to 25 cm, rarely to 45 cm
 318 across, with very hard wood and gray splitting and peeling bark; young shoots green, with 4 hardly protruding longitudinal ribs, covered with short, appressed, bipartite hairs, later subglabrous, 1-year old and older branches from yellowish gray to reddish brown; vegetative buds narrowly oblong, acuminate, slightly remote, reproductive buds, spherical, initiated in fall; leaves with 5–10 mm long, appressed-hairy petioles, pale or glaucous-green, paler beneath, with appressed, bipartite bristles on both sides and simple, curly, white hairs forming beards in axils of secondary nerves beneath, to 11 cm long, 5 cm wide, ovate or ovate-elliptic (f. *typica* Sanadze) to lanceolate or narrowly elliptic (f. *lanceolata* Kirchn.), acute or long-acuminate, rounded or cuneate at base, with 3–5(6) lateral nerves and network of small nerves very distinct on both sides. Flowers open before leaves; flower-bearing shoots 5–8 mm long; leaflets of involuclers yellowish green, 5–10(12) mm long, 3–6 mm wide, canescent outside, covered with dense, appressed, bipartite hairs, margin white-villous-tomentose, tip ovate, obtuse or acute, with short constricted mucro; flowers 15–25 per inflorescence, pedicels densely pubescent, 4–9 mm long; ovary obconical, densely appressed-hairy, 0.75–1 mm long, calyx-teeth triangular, as long as or slightly exceeding disk; petal lanceolate-triangular, acuminate, 2–2.5 mm long, 1.2 mm wide (in lower part), reflexed after flowering; stamens approximately half length of petals, anthers broadly ellipsoid, 0.6–0.8 mm long; disk slightly notched, flat; stigmas truncate; ripe fruit dark red, sometimes light red or pink, sweetish-sour, usually ellipsoid or cylindrical, 10–15 mm (f. *microcarpa* Sanadze) to 20–23–30 mm long (f. *macrocarpa* Dipp.) or broadening above, pyriform (f. *pyriformis* Sanadze), smooth or sometimes more or less faceted; stone ellipsoid or fusiform, nearly smooth. Fl. March–April, Fr. September. (Plate XXIV, Figure 1.)

Mountain forests in lower and middle belts, in the Caucasus to 1,500 m. Undergrowth in light, mainly oak and hornbeam forests, also at forest edges and in shrubby thickets on slopes. — European part: U. Dns., Bes., Crim.; Caucasus: everywhere. Gen. distr.: southern part of Centr. Eur., south-eastern part of Atl. Eur., Med. (central part of Italy), Bal.-As. Min. Described from Austria. Type in London.

Economic importance. The fruit has a pleasant sweetish-sour taste and a unique odor. It is eaten raw or used for making superb jams, stewed
 319 fruits, jellies, marmelades, beverages and wines. The fruits of *Cornel* are especially valuable as a remedy for scurvy and diarrhea. The dried fruits are used for flavoring; they contain 8–9% sugars, and 2–3.5% free acid, mainly malic acid. Stones and leaves are popular substitutes for

tea and coffee. The wood is very hard and heavy (density 0.92), of a fine texture, very solid, resilient, difficult to split and readily polished. It is excellent material for use in turneries to replace box-wood as material for handles, such as heavy blacksmith sledge hammers, cogs in millers' wheels, buttons, or shuttles. The thin trunks make excellent walking sticks and canes. Bark, branches and leaves yield red dyes as well as a yellow dye for fabrics. Wood, bark and leaves contain a high quality tannin suitable for tanning yellow even thick hides. An excellent nectariferous plant very suitable for hedges. In the USSR it is more or less confined to the southern part of the Ukraine and is not widely cultivated. It would be desirable to introduce it into the forest belts. In W. Europe many forms are known, including trees with a pyramidal crown (*f. pyramidalis* Dipp.), dwarf trees (*f. nana* Simon-Louis), forms with very crisp-haired leaves (*f. crispa* Dipp.), with variegated leaves: *f. aureo-elegantissima* Schelle with yellow or reddish leaf margins; *f. argenteo-marginata*, with white margin; and *f. aurea*, in which the leaves retain their yellow color long after blossoming. Other forms have yellowish white fruits (*f. albocarpa* C. K. Schn.) or yellow fruits (*f. flava* Vest., *f. lutescens* Wang., *f. xanthocarpa* Bean). The yellow-fruited form is also reported for the Caucasus.

Genus★ **CYNOXYLON*** Raf.

Raf. Alsogr. Amer. (1838) 59. — *Cornus* L. Sp. pl. (1753) 117, pro parte

Trees or shrubs, deciduous or evergreen or perennial, with opposite, entire leaves. Inflorescence capitate, surrounded by 4–6 large, petaloid leaflets produced from terminal bud of previous year's leafy shoot; ovary oblong, cylindrical or obconical. Free part of calyx tubular, cylindrical, entire or cut into 4 teeth. Petals greenish or yellowish white; disk annular, short-cylindrical; stones free or adnate into globose, fleshy, alveolate compound fruit.

- 320 I. Fruit free ★ *C. florida* (L.) Raf.
 + Stones adnate into globose, alveolate, compound fruit
 ★ *C. capitata* (Wall.) Nakai.

Section 1. BENTHAMIDIA (Spach) Pojark. in Bot. mat. Gerb. Bot. inst. AN SSSR, XII (1950) 182. — *Benthamidia* Spach, Hist. vég. phan. VIII (1839) 106. — *Cornus* sect. *Benthamidia* Harms in E. u. P. Pflanzenfam. III, 8 (1898) 267; Wanger. in Pflanzenr. IV, 229 (1910) 86, pro subgen. — Stones free.

Three species, one each in the eastern and western parts of N. America and Mexico.

★ *C. florida* (L.) Raf. Alsogr. Amer. (1838) 59; Britt. a. Shaf. N. Amer. trees (1908) 744; Britt a. Brown, Fl. North. Amer. St. Canada, 2 ed, II (1913)

* From the Greek *kynon* — dog, *xylon* — wood.



PLATE XXIV. 1 — *Cornus mas* L., branchlet with flowers, branchlet with fruit, inflorescence, fruit ;
 2 — *Thelycrania koenigii* (C. K. Schn.) Sanadze, branchlet with flowers, winter buds, flowers, stone ;
 3 — *Th. alba* (L.) Pojark., flowers, stone ; 4 — *Th. stolonifera* (Mchx.) Pojark., stone.

664. — *Cornus florida* L. Sp. pl. (1753) 117. — *Benthamidia florida* Spach, Hist. veg. phan. VIII (1839) 107. — *Benthamia florida* Nakai in Tokyo Bot. Mag. XXIII (1909) 41. — Ic.: Bot. Mag. tab. 526 et tab. 8315; Britt a. Brown, l. c. f. 3189.

High shrub or small tree with spreading crown, sometimes pendant (f. *pendula* Dipp.); leaves rather large, 6–14 cm, 4.5–8 cm wide, short-petioled, dark green above, when mature subglabrous, whitish beneath, with sparse, appressed and spreading hairs, dense along nerves, ovate, with parallel venation; 6–7 pairs of lateral nerves. Inflorescence of 20–30 small sessile flowers in capitate inflorescence on slightly expanded, 2–3 cm long stalk surrounded by a magnificent involucre of 4 white or pink, to 6.5 cm long, 4 cm wide leaflets; ovary cylindrical, slightly contracted near apex; free part of calyx short-tubular, with 4 small obtuse teeth, like hypanthium silvery-gray outside, densely covered with appressed hairs; petals oblong, ca. 4 mm long, 1.2–1.5 mm wide, greenish yellow; stamens and styles shorter than petals, more or less equal; fruit bright red, ellipsoidal, ca. 10 mm long, with withered calyx and style; pericarp thin, farinaceous, single stone oblong, longitudinally furrowed, ca. 8 mm long. Fl. April–June, Fr. July–September.

Rarely cultivated in the Crimea or on the Black Sea coast of the Caucasus. Gen. distr.: S. Canada, the Atlantic seaboard and south of the central part of N. America, in broadleaved forests to 1,500 m. Described from Virginia. Type in London.

- 323 Economic importance. One of the more beautiful, very profusely flowering, deciduous ornamental plants. For beauty its superb anthodia compare favorably with the flowers of magnolia. In the fall, the foliage turns bright red. A cold-resistant plant which has been cultivated for 200 years in many parts of England and Central Europe. It could probably be successfully grown in the USSR, apart from the Crimea and Caucasus, in the Ukraine, Belorussia and perhaps also the Baltic Republics. In America the bark of both branches and roots is used as a substitute for quinine, and has binding, tonic and stimulating properties. More recent research indicates that the bark contains the glucoside cornine (formerly regarded as an alkaloid), which yields d-glucose and scyllitol; there have also been found 3% tannic acid, a red dye, malic and other acids. The chocolate-colored wood has a high specific weight and is very solid and durable. It is valued as an excellent raw material for the manufacture of small articles.

Note. *C. nuttallii* (Audub.) Shaf., close to *C. florida*, from the mountains of the North American west, is grown locally on the Black Sea coast. Its larger involucral leaflets, usually 6(4–8), make it more ornamental than *C. florida*.

Section 2. *BENTHAMIA* (Lindl.) Nakai, Fl. sylv. koreana, XVI (1927) 69. — *Benthamia* Lindl. in Bot. Reg. (1833) sub tab. 1579, non A. Rich. — *Cornus* sect. *Benthamia* Harms in E. u. P. Pflanzenfam. III, 8 (1898) 267, Wanger. in Pflanzenr. IV, 229 (1910) 88, pro subgen. — *Dendrobenthamia* Hutch. in Ann. of Bot., New. ser. VI (1942) 92. — In each inflorescence, the outer layers of the pericarps are adnate, producing a globose, fleshy, alveolate compound fruit with numerous stones.

About 12 species in SE Asia, from the Himalayas and Indochina to Korea and Japan.

★ *C. capitata* (Wall.) Nakai in Cat. sem. et spor. Hort. bot. Univ. Tokyo (1923) 23. — *Cornus capitata* Wall. in Roxb. Fl. ind. edit. Carey et Wall. I (1820) 434. — *Benthamia fragifera* Lindl. in Bot. Reg. (1833) sub tab. 1579. — *Benthamia capitata* Nakai in Tokyo Bot. Mag. XXIII (1909) 41. — *Dendrobenthamia capitata* Hutch. in Ann. of Bot. New ser. VI (1942) 93. — *Benthamidia capitata* Hara in Journ. Arn. Arb. XXIX (1948) 115. — Ic.: Bot. Reg. tab. 1579; Bot. Mag. tab. 4641.

324 Small tree or high shrub; leaves coriaceous, dark green above, whitish beneath, covered with small papillae, both surfaces scabrous, with very small, appressed, bipartite hairs, 3.5–9 cm long, 1.5–3.5 cm wide on 3–10 mm long petioles, elliptic or oval-elliptic, with 4(5) remote, arcuately ascending nerves approximate at leaf margin. Inflorescence on 1.5–4 cm stalks, strongly expanding above, the 25–50 flowers crowded into inflated, semiglobose "head," 8–13 mm across surrounded by small, crowded, fleshy, faceted bracts; leaflets of involucre 4, coriaceous, yellowish or pinkish, to 4–5.5 cm long, 3–4.5 cm wide, obovate, abruptly tapering to short mucro; ovary conical; calyx tubular, irregularly 4–6-faceted, with 4 small obtuse teeth, gray, with appressed hairs outside; petals whitish, oboval, mucronate, 2–2.5 mm long, 1 mm wide; disk annular, cylindrical, with 4 deep furrows corresponding to 4 stamens; stamens only a fraction of length of petals; compound fruit to 3.5 cm across, orange-red, fleshy, sour-sweet, with a strawberry odor, containing numerous ellipsoidal stones to 8–10 mm long, 5 mm across. Fl. May. (Plate XXV, Figure 4.)

Cultivated at the southern coast of the Crimea and the Black Sea coast of the Caucasus. Gen. distr.: Ind.-Him. (Himalayas and western part of Yunnan province). Described from Nepal. Cotype in Leningrad.

Economic importance. An ornamental and fruit plant for southern regions, when in flower its large anthodia are very striking; in the fall its beauty is due to the bright, large, compound fruits. The fruits are edible; the wood is valued in the manufacture of small articles.

Note. *C. japonica* (DC.) Nakai, Section *Benthamia*, is cultivated in Batumi on the Black Sea coast of the Caucasus. It is just as ornamental as the present species but more cold-resistant, enduring even the climate of Central Europe. It is distinguished from *C. capitata* by the broad, ovate leaves of a soft consistency, thin pedicels 5–9 cm long, and an involucre of ovate, acuminate leaflets. It is highly recommended for the parks and gardens of the Crimea, the Ukraine, southern part of European Russia, and experimentally for the more northern and western regions.

Genus 1081. **CHAMAEPERICLYMENUM** * Graebn.

Graebn. in Aschers u. Graebn. Fl. nordost-deutsch. Flachland. (1897) 538. — *Cornus* L. Sp. pl. (1753) 117, p.p. — *Eukrania* Raf Alsogr. Amer. (1838) 59, p.p. quoad deser. — *Cornella* Rydb. in Bull. Torr. Bot. Club, XXXIII (1906) 147. — *Arctocrania* Nakai in Tokyo Bot. Mag. XXIII (1909) 39

* From the Greek *chamai* — on the ground, and *periclymenon* — Dioscorides' name for a prostrate or twining plant.

Semishrubs, with perennial, woody, creeping, underground stems or low
 325 herbaceous stems, perennial only at base; inflorescence capitate-umbellate
 surrounded by involucre of 4 (very rarely 6), white; petaloid leaflets, con-
 sisting of 4 groups of cymose, few-flowered inflorescences with obsolete
 axes and pedicels, and a central flower (sometimes inflorescence). Calyx
 of 4 short teeth; petals white or black-purple; ovary oblong-ovoid; fruit
 small, red, globose, with thin, slightly juicy exocarp and smooth spherical
 stones.

Three species, one of them hybridogenic, all growing in the USSR.

1. Stem uniformly leafy, with 3–6 pairs of leaves; shoots at flowering
 with distinct stem bearing 2 leaves in axils of upper leaves; petals
 black-purple; ovary with white bristles in upper part 1. *C. suecicum* (L.) Graebn.
- + Stem with 6 leaves at apex, appearing whorled 2.
2. Stem with 1 pair of small or even squamiform leaves below whorl
 or leafless; petals yellowish white; ovary uniformly and densely
 hairy 2. *C. canadense* (L.) Graebn.
- + Stem with 1 pair of large leaves below whorl; petals black-purple
 or with more or less yellowish border 3. *C. unalaschkense* (Ldb.) Rydb.

1. *C. suecicum* (L.) Graebn.: in Aschers. u. Graebn. Fl. nordost-
 deutsch. Flachland. (1898) 539; Sugawara, III. fl. Saghal. III, 1421; Poyar-
 kova in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 169. — *Cornus*
suecica L. Sp. pl. (1753) 118; Ldb. Fl. Ross. II, 377; Trautv. et Mey.
 Fl. ochot. 45; Rgl. et Til. Fl. ajan. (1858) 99; Maxim. Prim. fl. amur.
 134; Fr. Schmidt in Mém. Acad. Sc. Pétersb. VII sér. XII, 2, 141; Meinsh
 Fl. ingr. 141; Kom., Fl. Man'chzh. III, 182; Kom. and Alis., Opred. rast.
 Dal'nevost. kr. II, 830. — *Cornus borealis* Krasch. in Gorter. Fl. ingr.
 (1761) 24. — *Cornus herbacea* Steller in Pall. Neue nördl. Beitr. II
 (1782) 300; Pall. Fl. Ross. I, 52, p. p. — *Cornus biramis* Stokes, Bot.
 Mat. Med. I (1812) 221. — *Eukrania suecica* Raf. Alsogr. Amer. (1838)
 59. — *Cornella suecica* Rydb. in Bull. Torr. Bot. Club, XXXIII (1906)
 147. — *Arctocrania suecica* Nakai in Tokyo Bot. Mag. XXIII (1909) 39. —
 Ic.: Fedch. and Fler., Fl. Evrop. Ross. Fig. 590; Hegi, III. Fl. V, 2, f.
 2598–2601; Sugawara, l. c. tab. 656. — Exs.: Herb. Fl. ingr. No. 278; Pl.
 Finland. exs. No. 837.

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Shrub; semishrub with thin, woody, creeping, horizontal, underground
 rhizome, sometimes rhizome nearly vertical in upper part, rhizome and
 rhizome branches terminating in simple, herbaceous stems, dying nearly to
 base in fall; stems (4)6–25 cm high, 4-faced, covered with sparse appressed
 hairs, sometimes reddish in lower part, with few pairs of brownish, squami-
 form leaves below, (3)4–6 pairs of green leaves above, these becoming
 gradually enlarged at stem apex; 2 lower pairs of scales subtend regenera-
 tion buds which sprout into flower-bearing stems of the following year;
 leaves sessile, pale green, with remote, appressed hairs above, paler be-
 neath, glaucescent, glabrous, upper leaves (1.3)1.5–4.5 cm long, ovate or

elliptic, with cuneate or rounded base, short-acuminate, with 2–3 pairs of lateral nerves diverging near base of blade; upper 2 leaves subtend shoots which at flowering usually bear 2 leaves and a well-developed stem. Inflorescences on 1.5–4 cm stalks, slightly overtopping terminal leaves; involucre 0.7–1.5 cm long, elliptic or ovate, short-acuminate, 5–7-nerved; flowers 8–25(29) in inflorescence, on 1–2 mm pedicels; sepals glabrous, triangular, acute, 0.4 mm long, $1\frac{1}{2}$ times as long as the flat, cylindrical, annular disk; petals narrowly triangular, 1.5–2 mm long, purple-black, reflexed after flowering, the dorsally prominent rib produced to a truncate mucro; stamens as long as petals, with pink-white anthers; ovary ovoid, with dense white appressed bristles only at base; style glabrous, cylindrical, as long as stamens or slightly longer, stigma truncate; fruit ovoid-globose or globose, 7–10 mm across, red; stone globose, 3–3.5 mm long and as wide, slightly flattened or pointed at ends. Fl. end of May, beginning of July, Fr. end of July, beginning of September. (Plate XXV, Figures 1, 1a.)

In groups or forming pure thickets in open damp, mossy forests, particularly birch, shrubby thickets, swampy meadows, along edges of peat bogs. — Arctic: Arc. Eur., including Kolguyev Island, Chuk., An.; European part: Kar.-Lap., Dv.-Pech. (northern part), Lad.-Ilm.; Far East: Kamch. (only coastal and island regions), Okh., Uda, Uss. (only coast), Sakh. Gen. distr.: Arc., Scand., Atl. Eur. (northern part), Jap. (northern part of Hokkaido Island), Ber., N. Am. (two disjunct areas: from the Yukon to Vancouver in the west, from the southern part of Labrador to Newfoundland in the east). Described from Sweden. Type in London.

- 327 2. *C. canadense* (L.) Graebn. in Aschers. u. Graebn. Fl. nordost-deutsch. Flachland (1898) 539; Sugawara, III. fl. Saghal. III, 1419; Poyarkova in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 169. — *Cornus canadensis* L. Sp. pl. (1753) 117; Ldb. Fl. Ross. II, 378; Trautv. et Mey. Fl. ochot. 45; Rgl. et Til. Fl. ajan. 99; Maxim. Prim. fl. amur. 134; Fr. Schmidt in Mem. Acad. Sc. Petersb. VII ser. XII, 2, 141; Kom., Fl. Man'chzh. III, 181; Kom. and Alis., Opred. rast. Dal'nevost. kr. II, 830. — *Cornus herbacea* b. *canadensis* Pall. Fl. Ross. I (1784) 52. — *Eukrania canadensis* Raf. Alsogr. Amer. (1838) 59. — *Cornella canadensis* Rydb. in Bull. Torr. Bot. Club. XXXIII (1906) 147. — *Arctocrania canadensis* Nakai in Tokyo Bot. Mag. XXIII (1909) 40. — *Cynoxylon canadensis* J. H. Shaffn. Cat. Ohio (1914) tab. 222. — *Mesomora canadensis* Nieuwl. ex Luneelin Am. Midl. Nat. IV (1916) 487. — Ic.: Brittona. Brown, III. Fl. N. Am. St. Can. ed. II (1913) f. 3190; Nakai, Fl. sylv. koreana, XVI, tab. 18; Sugawara, l. c. tab. 655. — Exs.: G. R. F. No. 2358.

Shrub; semishrub with creeping, woody, branching rhizome; stem herbaceous, simple, erect, hexahedral, with sparse appressed hairs, dying in fall except for lowest part, with few pairs of small, squamiform, brown leaves at base, at top of stem leaves in whorls of 6, of which larger upper pair are cauline; the remaining 4 belong to 2 reduced axillary shoots (usually not developed at flowering); below whorl stem often bears a pair of small green or squamiform leaves; leaves in whorl ovate or obovate to narrowly rhombic-elliptic, cuneate at base, tapering to short, 1.3–3 mm long petioles, apex short- or long-acuminate, 2.5–8 cm long, bright green distinctly paler beneath, with appressed hairs on both sides, more densely at upper face,

with 2–3 remote pairs of parallel lateral nerves. Inflorescence distinctly shorter than leaves, capitate-umbellate on 1–3 cm long stalk; involucre of 4, very rarely 6, white, ovate leaflets, 10–23.5 mm long, flowers 12–35; pedicels short, 1–2 mm long; calyx-teeth broadly triangular, as long as disk; petals and other parts of flower (except for anthers) yellowish-greenish, petals, ovate-triangular, acuminate, all or some with dorsal keel produced into subulate appendage, sometimes as long as petals; styles shorter than petals and stamens; anthers white; ovary and base of calyx-teeth white, entirely covered with appressed hairs; fruit bright red, globular, 5–7 mm across, with small ovoid-globular stone. Fl. June–July, Fr. from middle of August to end of September. (Plate XXV, Figure 2.)

- 328 Always in large groups or thickets in moist, mossy, mainly coniferous, Siberian stone pine and fir forests, rarely in mixed forests. — Far East: Okh., Ze.-Bu., Uda, Uss., Sakh. Gen. distr.: Arc. (S. Greenland), Jap. (Hokkaido Island and Honshu), N. Korea, Ber. (S. Alaska, E. Aleutians), N. Am. (2 disjunct areas west and east, southward on mountains to 37° N). Described from Canada. Type in London.

3. *C. unalaschkense* (Ldb.) Rydb. Fl. Rocky Mts. (1917) 635; Poyarkova in Bot. mat. Gerb. Bot. inst. AN SSSR, XII (1950) 169. — *Cornus canadensis* Cham. et Schlecht. in Linnaea, 3 (1828) 139, p. p. non L.; Britt. a. Brown, Fl. N. Amer. Canada, ed. 2, II, 664, p. p. (quoad syn.: *C. unalaschkensis*); Rickett in N. Amer. fl. 28 B, 310 p. p. — *Cornus unalaschkensis* Ldb. Fl. Ross. II, 1 (1844) 378. — *Cornella unalaschkensis* Rydb. in Bull. Torr. Bot. Club. 33 (1906) 147. — *Cornus canadensis* var. *intermedia* Farr. in Contr. Bot. Lab. Univ. Pa. 2 (1904) 423; Fern. et Wieg. in Rhodora, 13 (1911) 107. — *Svida unalaschkensis* A. Heller, Cat. N. Am. Pl. ed. 3 (1914) 273. — *Cornus canadensis* × *suecica* Hult. Fl. Aleut. Isl. (1937) 253; Flora Alaska a. Yukon, VII (1947) 1184.

Shrub, morphologically intermediate between *C. canadense* and *C. suecicum*. Leaves in whorls of 6 at top of stem, below this a pair of large leaves, slightly smaller than whorled leaves; petioles developed or lacking; leaves range from ovate, short acuminate, to elliptic and obovate, often long-acuminate; venation usually intermediate: all three pairs of lateral nerves diverge in lower part of blade; stalk of inflorescence usually shorter than, rarely as long as or slightly longer than leaves; dense, appressed, white hairs cover entire ovary, usually up to base of calyx-teeth (rarely only lower part); petals always pigmented: uniformly black-purple or with more or less colorless margin; fruit as in preceding species; fruiting apparently limited. Fl. July. (Plate XXV, Figure 3.)

Damp forests, meadow bogs. — Far East: Okh. (near Ayan). Gen. distr.: Ber. (Aleutians, the Yukon, Alaska), N. Am. (western part — coastal, Rocky Mountains, Sitka, in the south to 39° N; also reported for the eastern part — Labrador). Described from Unalaska in the Aleutians. Type in Leningrad.

- Note. *C. unalaschkense* is variously interpreted by different authors. The Americans tend to treat it as a variety of *C. canadense* — var. *intermedia* Farr. Hulten insists that it is a cross between *C. canadense* ×
329 *C. suecicum*. Specimens from the traditional habitat are clearly intermediate between both the species, as is shown from the diagnosis.

Similar specimens also grow in Ayan and Sitka, the hybrid derivation of which it is difficult to dispute. On the other hand there are specimens from the N. American distribution area which do not deviate from *C. canadense*, with the exception of a pair of large leaves below the terminal whorl, which produces a habit strikingly similar to that of typical specimens of *C. unalaschkense*. They are probably related to *C. canadense* and may well be confused with *C. unalaschkense*, the distribution area of which does not overlap that of its parental forms: it deeply penetrates the mainland in the region of the Yukon and Alaska and also stretches through the Rocky Mountains, whereas *C. suecicum* grows in the maritime countries, never reaching any great distance from the shores. According to Hulten, *C. unalaschkense* grows throughout the Aleutians and *C. canadense* is only reported for the easternmost point, close to Alaska. This characteristic geographical distribution of *C. unalaschkense* makes it possible to regard it as a species of hybrid origin established in a range of its own which apparently continues to expand.

Genus 1082. **BOTHROCARYUM*** (Koehe) Pojark.

Pojark. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 169.— *Cornus* subgen. *Mesomera* Raf. Alsogr. amer. (1838) 58; Nakai, Fl. sylv. koreana, XVI (1927) 81, pro sect.— *Cornus* sect. *Thelycrania* 1. *Alternifoliae* C. A. M. in Ann. sc. nat. 3 ser. IV (1845) 59.— *Cornus* sect. *Microcarpum* subsect. *Bothrocaryum* Koehe in Gartenfl. XLV (1896) 285.— *Cornus* subgen. *Thelycrania* sect. *Bothrocaryum* Wanger. in Pflanzenr. IV, 229 (1910) 49

Trees and shrubs, with alternate leaves. Buds ovoid, with 4–6 outer spiral, imbricate scales. Inflorescences terminate, young leafy shoots, compound, cymose, corymbiform paniculate, with repeatedly branching alternate axes, passing into simple monochasia. Calyx of 4 small teeth; petals white; styles cylindrical; stigma capitate; ovary ovoid. Fruit blue-black or dark blue, ovoid; stone subglobular, obtusely ribbed, with large, deep apical pit.

330 Three species: *B. controversum* (Hemsl.) Pojark. in E. Asia (Kuriles and Japan to the Himalayas), *B. longipetiolatum* (Hayata) Pojark. comb. nov. on Taiwan, and *B. alternifolium* (L.f.) Pojark., on the Atlantic coast of N. America.

1. *B. controversum* (Hemsl.) Pojark. in Bot. mat. gerb. Bot. inst. ANSSSR, XII (1950) 170.— *Cornus brachypoda* C. Koch, Dendr. I (1869) 685, non C. A. M.— *Cornus macrophylla* Koehe in Gartenfl. XLV (1896) 285; Kom., Fl. Man'chzh. III (1907) 181, non Wall.— *Cornus controversa* Hemsl. in Kew Bull. (1909) 332; C. K. Schn. Laubholzk. II (1909) 437; Wanger. in Pflanzenr. IV, 229, 49; Kitag. Lineam. fl. Mansh. 344.— Ic.: C. K. Schn. l. c. f. 294 i, 295 a–d; Bot. Mag. tab. 8464; Miyabe et Kudo, Ic. forest trees Hokk. III, tab. 81; Shirasawa, Ic. Ess. for. Jap. I, tab. 77, f. 12–23; Tarasaki, Ic. fl. jap. (1933) 454; Poyarkova l. c. f. 1.

Shrub [sic]; tree 9–12(20) m high, with cracked, grayish brown bark and flat crown; branches horizontally spreading; young shoots glabrous to

* From the Greek *bothros* —pit, *caryon* —stone, referring to the shape of the fruit stone with an apical pit.

sparsely covered with appressed bipartite hairs, purple, reddish violet to black violet, with sparse lenticels; buds glabrous, ovoid, obtuse, 5–9 mm long, with coriaceous, broadly ovate, obtuse, reddish-brown, glabrous, shiny scales; leaves alternate, crowded near apex of branches, with rather long, 2–6 cm petioles, sparingly pubescent at first, becoming glabrous, dark green above, shiny, with sparse appressed hairs, to subglabrous, pale, glaucous beneath, covered with small papillae, with rather dense, very short hairs, (3)8–15 cm long, (1.5)5–8 cm wide, ovate, rounded-ovate to oblong-oval-elliptic, with broadly cuneate or subrounded base, usually short-acuminate produced into short mucro, with 5–8, usually 6–7 prominent lateral nerves and a distinct network of small nerves beneath. Inflorescences on 2–3 cm long peduncles, corymbiform panicleate, at end of flowering strongly divergent to 18 cm across, branches, like pedicels, rather densely covered with spreading hairs; ovary silvery-gray outside, densely covered with appressed hairs; calyx-teeth usually obsolete or very short, to 0.25 mm long, acute; petals broadly lanceolate, 5–6 mm long, 1.75–2 mm wide at base, usually obtuse, with rather dense appressed, bipartite hairs; filaments longer than petals, 6–7.5 cm long; anthers 1.5–2 mm long, narrowly ovoid; styles $\frac{1}{2}$ to $\frac{2}{3}$ length of stamens, 2.5–3 mm long, with flat stigma; disk more or less hairy above; fruit small, 6–8 cm across, subglobular, bluish-black, stone much flattened, 4–6 mm long, 3–4.5 mm across, usually with 7 obtuse ribs diverging at poles and deep distal pit. Fl. June, Fr. August–September. (Plate XXV, Figures 5, 5a, 5b.)

Far East: Sakh. Gen. distr.: S. Manchuria, Korea, Tib., C. and W. Ch., E. Him. Described from the Himalayas. Type in London.

Economic importance. Its uniquely shaped crown, large 2-colored leaves, large inflorescences and blue-black fruits make this an ornamental tree, well worthy of cultivation. The soft, white, lightweight wood is used to manufacture vessels and toys.

Genus 1083 **THELYCRANIA** * (Dumort.) Fourr.

Fourr. in Ann. Soc. Linn. de Lyon, Nouv. ser. XVI (1868) 394. — Cornus L. Sp. pl. (1753) 117 p. p. — Cornus § 2. Thelycrania Dumort. Flor. belg (1827) 83. — Svjda Opiz, Seznam in Malá Encyklop. Nauk, Naklad. česk. Mus. X (1852) 94, nom. nud.; Small, Fl. South. Un. St. (1903) 853, diagn. — Cornus sect. Microcarpum subg. Amblycaryum Koehne in Gartenfl. XLV (1896) 286. — Cornus subgen. Thelycrania sect. Amblycaryum Wanger. in Pflanzenr. IV, 229 (1910) 52. — Cornus sect. Mesomora et sect. Amblycaryum Nakai, Fl. sylv. koreana, XVI (1927) 78, 83. — Ossea lunell in Am. Middl. Nat. 4 (1916) 487

Trees and shrubs with opposite leaves. Buds narrowly conical, with 1 pair of outer and 2 opposite pairs of inner scales. Inflorescences terminating leafy shoots without involucre, of 5 main axes arranged in the semblance of an umbel or in pairs and branching like a dichasium, sometimes more or less umbelliform. Calyx-teeth 4(5), small; petals white; ovary ovoid or obconical. Fruit juicy, globular, black, blue or white; stone usually globular, rarely slightly elongate, sometimes flattened above or laterally, entire, without distal pit.

* From the Greek thelys — feminine, kraneia — horn, a literal translation of "Cornus foemina" of the Romans, who referred to T. sanguinea as feminine and to "Cornus mascula" (C. mas L.) as masculine.

About 40 species in the temperate zones of the northern hemisphere, especially SE Asia and N. America, three species in Mexico, one in the N. Andes.

Economic importance. All the species are suitable as ornamental trees and shrubs in greenbelt areas, many of them make good hedges. Their tough, hard wood is easily cut and is useful in carpentry and turning. The flexible branches are woven into baskets and mats and made into hoops, pipe stems and shoe-nails. The bark contains tannin and the black fruits yield dyes. The fruit is readily eaten by poultry. Their stones contain large amounts of a greenish oil suitable for burning.

1. Leaves to 13–16 cm long, with 5–6 or 6–9 lateral nerves 2.
2. Leaves to 8–10 cm long, with 3–5 nerves 3.
2. Leaves to 13 cm long, green beneath, with 5–6 lateral nerves. Anthers dull purple, fruit 7–10 mm long. 2. *T. koenigii* (C. K. Schn.) Sanadze.
- + Leaves to 16 cm long, whitish from papillae beneath, with 6–8(9) lateral nerves. Anthers white, fruit 4.5–6 cm across. 2. *T. brachypoda* (C. A. M.) Pojark.
3. Fruit bluish or white, its stones distinctly flattened laterally 4.
- + Fruit black, stones globular or slightly flattened above 5.
4. Stones much flattened, usually oblique-oblong, elongating, rarely nearly as long as wide. Calyx-teeth inconspicuous. 8. *T. alba* (L.) Pojark.
- + Stones less flattened, usually expanding in width or subglobular. Calyx-teeth conspicuous, acute, triangular ★ *T. stolonifera* (Mchx.) Pojark.
5. Leaves covered beneath with simple, spreading, slightly curly hairs 3. *T. sanguinea* (L.) Fourr.
- + Leaves covered beneath with straight appressed, bipartite hairs. 6.
6. Leaves oblong-elliptic, acuminate, with 3–4 pairs of lateral nerves. Calyx-teeth conspicuous, longer than disk. 7.
- + Leaves ovate, elliptic-ovate or rounded, with 4–5 (sometimes 3) pairs of lateral nerves 8.
7. Upper leaves dark green, shiny, darker than the lower; stamens as long as styles, anthers 2.5–3(3.5) mm long; stones of fruit hardly flattened, without furrow along suture 5. *T. iberica* (G. Woron.) Pojark.
- + Upper leaves light green, slightly darker than lower; stamens longer than styles, anthers 2–2.5 mm long. Stones distinctly flattened, with rather broad furrow along suture 6. *T. meyeri* Pojark.
8. Leaves wide, rounded; calyx-teeth 2–2.5 times as long as disk; styles clavately thickened at apex, anthers 1–1.5 mm long 7. *T. darvasica* Pojark.
- + Leaves ovate or ovate-elliptic; calyx-teeth shorter than, as long as, rarely exceeding disk; styles with abruptly thickened tip, anthers 2–2.5 mm long. 4. *T. australis* (C. A. M.) Sanadze.

Section 1. AMBLYCARYUM (Koehne) Pojark. comb. nova. — *Cornus* sect. *Microcarpum* subsect. *Amblycaryum* Koehne in *Gartenflora*, XLV (1896) 286. — *Cornus* subgen. *Thelycrania* sect. *Amblycaryum* subsect. *Nigrae et Corynostylae* Wanger. in *Pflanzenr.* IV, 229 (1910) 64, 68. — Styles cylindrical or with clavate apex. Fruit black or dark blue, stone globular, slightly flattened above.

With few exceptions, an Asian species.

Series 1. *Macrophyllae* Pojark. — Leaves to 16 cm long, whitish from papillae beneath, with 6–10 lateral nerves. Anthers white. Fruit small, 4–6 mm across.

SE Asian species: *T. macrophylla* (Wall.) Pojark. comb. nova — Himalayas and China (the Chinese specimens differ slightly from the type); *T. brachypoda* (C. A. M.) Pojark., Japan and Korea.

1. *T. brachypoda* (C. A. M.) Pojark. in *Bot. mat. gerb. Bot. inst. AN SSSR*, XII (1950) 172. — *Cornus brachypoda* C. A. M. in *Ann. Sc. Nat.* 3 sér. IV (1845) 74; in *Mém. Acad. Sc. Pétersb.* 6 ser. VII, Sc. nat. 2, IV (1845) 222; Koehne in *Gartenfl.* XLVI, 94; Wanger. in *Pflanzenr.* IV, 229, 64; Mak. et Nem. *Fl. jap.* 2 ed. 853. — *Cornus alba* S. et Z. in *Abh. Akad. Muench.* IV, 2 (1845) 194; Miq. in *Ann. Mus. bot. Lugd.-Bat.* II (1865) 160, non L. — *Cornus macrophylla* Forb. et Hemsl. in *Journ. Linn. Soc.* XXII (1888) 345; C. K. Schn. *Laudholz.* II, 444, pro parte; Vorob'ev in *Tr. Dal'nev. bazy AN ser. obshch.* I (1948) 27, non Wall. — *Cornus corynostylis* Koehne in *Gartenfl.* XLV (1896) 286. — *C. ignorata* Shirasawa, *Icon. Ess. for Jap.* I (1899) 121, non C. Koch. — *l.c.*: *Gartenfl.* XLV, F. 51–4 a, b; Shirasawa *l.c.* tab. 77, f. 1–12; Nakai, *Fl. sylv. koreana*, XVI (1927) tab. XXIX; Tarasaki. *l.c.* *fl. Jap.* (1933) f. 455.

Shrub or small tree, with longitudinally cracking bark; shoots and young branches dark, reddish brown, subglabrous even when young. Leaves with 1.2–3 cm petioles, to 16 cm long, 8–9 cm wide, dark green above, shiny, whitish-glaucous beneath, both surfaces with short appressed bipartite hairs or subglabrous above, oblong-elliptic or oval (rarely broadly ovate), with cuneate or rounded base, acute or often acuminate, produced into often long and more or less curved mucro, margins smooth or slightly undulant so as to appear dentate, 6–8(9) pairs of lateral nerves prominent beneath
334 by their yellow color; network of small nerves not clearly defined. Inflorescences dense, many-flowered, broad, to 10 mm long, 15 cm wide, on 4.5–5 cm long pedicels, with remote paired lateral, nearly horizontal branches, silvery-gray ovary entirely covered with appressed hairs, inflorescence sparsely pubescent; pedicels 2.5–5 mm; calyx-teeth triangular, short, hardly exceeding pulviniform disk; petals lanceolate, 4–5 mm long, 1–1.5 mm wide; stamens as long as petals, anthers 1.75–2 mm long; styles as long as filaments, short-thickened below flat stigma; fruit globular, black, 5.5–6 mm long; stone ca. 4 mm long, smooth, globular. Fl. from June, Fr. from August.

Forests. — Far East: Sakh. Gen. distr.: Korea, Jap. Described from Japan. Type in Leningrad.

Economic importance. An ornamental species, not cultivated in the USSR.

Note. Vorob'ev (l. c.) reports "*Cornus macrophylla* Wall." for Kunashir Island. The Japanese race should apparently be interpreted as the generally accepted *T. macrophylla* (Wall.) Pojark., i. e., *T. brachypoda* (C. A. M.) Pojark., the specific status of which is acknowledged by Japanese botanists themselves. *T. macrophylla* differs from *T. brachypoda* in the shape of the style, which is thickened from a good part, and by the long stamens which exceed the style as well as the petals.

The presence of *T. brachypoda* in the Kuriles requires corroboration, as the only specimen in the Herbarium of the Botanical Institute described as "*Cornus macrophylla*" proved to belong to *Bothrocaryum controversum* (Hemsl.) Pojark. The confusion over the naming of these two species, which belong to different genera, lingers to this day because of Koehne's (Gartenflora, XLVII, 1897) mistake in interpreting *Cornus macrophylla* Wall. as *Cornus controversa* Hemsl.

Series 2. Koenigianae Pojark. — Leaves to 13 cm long, green beneath, without papillae, with 5–6 pairs of lateral nerves. Anthers dull purple. Fruit 7–10 mm across. One species.

2. *T. koenigii* (C. K. Schn.) Sanadze in Tr. Tbil. univ. XXIXa (1946) 44; Poyarkova in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 172. — *Cornus koenigii* C. K. Schn. in Fedde, Repert. sp. nov. VII (1909) 229; Laubholz. II (1909) 449; Yuzepchuk in Bot. mat. Gerb. Gl. Bot. Sada, II, 28 (1919) 449; Grossg., Fl. Kavk. III (1932) 197. — *C. australis* var. *Koenigii* Wanger. in Pflanzenr. IV, 229 (1910) 75; Medved., Der. i kust. Kavk. (1919) 175. — *Svida koenigii* Pojark. ex Grossg., Opred. rast. Kavk. (1949) 205. — Ic.: C. K. Schn. Laubholz. II, fig. 299 d–e. *tralis* var. *Koenigii* Wanger. in Pflanzenr. IV, 229 (1910) 75; Medved., Der. i kust. Kavk. (1919) 175. — *Svida koenigii* Pojark. ex Grossg., Opred. rast. Kavk. (1949) 205. — Ic.: C. K. Schn. Laubholz. II, fig. 299 d–e.

Shrub, small tree or high shrub, to 4 m; shoots slightly faceted, dull green, when young with sparse appressed hairs to subglabrous, annual shoots dark reddish-brown; older branches light brown with longitudinally wrinkled bark; leaves 5–13 mm long, 2.5–8 mm wide, dark green above, much paler beneath, usually both surfaces covered with thick, appressed, short, bipartite hairs, elliptic or ovate, usually elongate (usually half as wide as long), rarely wide or oblong, base usually broad, cuneate, rarely rounded-cuneate, usually gradually acuminate, rarely short-acuminate, attenuate, rarely abruptly tapering to mucro; nerves commonly 5–6 pairs, in lower leaves often only 4 pairs; transverse nerves of the third order and in part also network of smaller nerves very prominent; petioles 1–2.2 cm. Inflorescences on 3.5–5 cm pedicels, slightly inflated, 2–3 cm long, 4–6 cm wide; branches of inflorescence and pedicels densely covered with appressed hairs; ovary entirely covered with appressed brownish hairs; calyx-teeth (0.6) 0.8–1.1 mm long, to 1.5 times as long, sometimes nearly as long as disk; petals broadly or narrowly lanceolate, 6–7.2 mm long, 1.8–2 mm wide at base, with remote appressed short hairs on outside;

filaments 4.5–5.5 mm long, shorter than petals and style; fruit black, glo-
bular, 7–10 mm across, stone 5–6.5 mm long, 6–7.5 mm across, nearly
globular or distinctly flattened, apically, rarely laterally with 8 very fine
furrows converging at poles. Fl. end of May, June, Fr. September–
October. (Plate XXIV, Figure 2.)

Forests in lower and middle mountain belt, along forest edges, and
woody-shrubby thickets along riverbanks. — Caucasus: W., S. Transc.
(Akhalsikhe district). Gen. distr.: Bal.-As. Min. (Artvin, Lazistan and
Trebizond). Described from Murgulzu River in Artvin district. Type in
Vienna?

Economic importance. An ornamental tree which deserves to be planted
in parks and gardens in the western parts of European USSR.

Series 3. *Sanguineae* Pojark. — Leaves to 10 cm long, rarely longer than
8 cm, with 3–5 pairs of lateral nerves, network of small nerves usually in-
distinct beneath. Anthers white. In addition to the 5 Russian species, this
series includes *T. cilicica* (Wanger.) Pojark. from Asia Minor, and two
E. Asian species: *T. coreana* (Wanger.) Pojark. comb. nov. from Korea
and Hopeh province, N. China, and *T. koehneana* (Wanger.) Pojark. comb.
nov. from the northern part of Shensi province.

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3. *T. sanguinea* (L.) Fourr. in Ann. soc. Linn. de Lyon, Nouv. sér.
XVI (1868) 394; Poyarkova in Bot. mat. gerb. Bot. inst. AN SSSR,
XII (1950) 172. — *Cornus sanguinea* L. Sp. pl. (1753) 117; Pall. Fl.
Ross. I, 50, p. p.; Besser, Prim. fl. Galic. I, 124; Ldb. Fl. Ross. II,
378, p. p.; C. A. Meyer in Ann. sc. Nat. 3 sér. IV, 68; in Mém. Acad.
Sc. Pétersb. 6 sér. VII, 2 (1849) 215; Boiss. Fl. or. II, 1092; Shmal'g.,
Fl. I, 431 p. p.; C. K. Schn. Laubholz. II, 448; Fedch. and Fler., Fl.
Evr. Ross. 709; Hegi, III. Fl. V, 2, 1545; Maevsk., Fl. Sr. Ross. (1940)
558. — ? *C. citrifolia* Wahlb. in Isis, XXI (1828) 932. — *C. latifolia*
Bray in Denkschr. Bot. Gesellsch. Regensb. I, 2 (1818) 35. — *Svida*
sanguinea Opiz in Malá Encyclop. Nauk, Naklad. česk. Mus. X (1852)
94. — Ic.: Hegi, l. c. tab. 204, f. 3a–c; f. 2589–2592. — Exs.: G. R. F.
No. 922; Fl. polon. exs. No. 441.

Shrub or small tree 2–4 m high, with procumbent or drooping branches,
the gray bark with fine longitudinal and transverse cracks; young shoots
green, appressed-hairy, soon turning purple or brown-red, two-year old
shoots glabrous, olive-brown; petioles 8–18 mm, with scattered appressed
hairs to subglabrous; leaves pale green, with short, scattered, appressed,
bipartite hairs paler above, often glaucescent, more densely covered with
long simple spreading curly hairs beneath, to 10 cm long, 6.5 cm wide,
usually elliptic, often elongate, with cuneate base, and more or less long-
acuminate (var. *communis* C. A. M.), rarely ovate-elliptic or broadly
ovate-elliptic, with rounded base and rounded or short-acuminate apex,
tapering to short mucro (var. *latifolia* C. A. M., *Cornus latifolia*
Bray); lateral nerves usually 3–5 on each side, network of small nerves
distinctly protruding. Inflorescences on 2.5–3.5 cm long pedicels, slightly
convex or nearly flat, branches and pedicels with short appressed hairs;
pedicels to 6 mm; ovary whitish gray, entirely covered with appressed hairs;
calyx-teeth triangular or ovate-triangular, usually shorter than, rarely as
long as or slightly longer than disk; petals 4.5–6 mm long, 1.5 mm wide,

lanceolate or linear-lanceolate, appressed-hairy outside; stamens shorter than petals, filaments 4–5 mm long, anthers 1.8–2.5 mm long; style shorter than stamens, 3.5–4 mm long with clavate apex and capitate, truncate stigma; fruit blue-black, globular, 5–8 mm across, stone 4–4.5 mm long, 5–6 mm across, globular or flattened-globular, smooth or with few faint furrows. Fl. June, Fr. August–September. A second flowering is often observed in the fall.

Undergrowth of light broadleaved and mixed forests, shrubby thickets, together with willows in moist localities along shores of lakes, rivers and swamps, as well as on dry, sunny slopes. — European part: Balt., Lad.-Ilm. 337 (SW), U. V. (near Oka in the south), U. Dnp., M. D., V.-Don, U. Dns., Bes., Bl., L. Don (western part). Gen. distr.: Scand. (southern part), Centr. and Atl. Eur., Med. (S. Europe), Bal.-As. Min. (northern part of Balkans). Described from W. Europe. Type in London.

Economic importance. The fleshy pericarp contains a gray dyestuff and 19–35(55)% of a non-drying, green, technical oil suitable for burning. Some sources claim it to be suitable for food after refining. The seeds contain even more of this oil — 40–45%. The bark may be used as bast. The reddish wood is very tough, finely grained; it cuts badly and is used in carpentry and turning. The thin, flexible branches are used in the manufacture of baskets, hoops, and pipe stems. An ornamental plant suitable for hedges. The known ornamental forms with variegated leaves are f. *variegata* (Dipp.) Pojark. comb. nov., with white-spotted leaves, f. *aureo-variegata* (Purpus) Pojark. comb. n., f. *mietschii* (Purpus) Pojark. comb. n., with young shoots bearing pale yellow, finely spotted leaves. An interesting form is var. *viridissima* (Dieck) Pojark. comb. nov., with shoots and fruits green.

Note. *T. sanguinea* does not grow in the Crimea. The plant cultivated under this name (or identified as such in herbaria) is in fact *T. australis*.

4. *T. australis* (C. A. M.) Sanadze in Tr. Tbil. univ. XXIXa (1946) 38, pro parte (v. *microcarpa* Sanadze); Poyarkova in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 172, s. str. — *Cornus australis* C. A. M. in Bull. phys.-math. Acad. Sc. Pétersb. III (1845) 372, p. p. et in Mém. Acad. Sc. 6 sér. VII, 2 (1849) 211, p. p.; Boiss. Fl. or. II, 1092, p. p.; C. K. Schn. Laubholz. II, 448, s. str.; Wanger. in Pflanzenr. IV, 229, 74, p. p.; Grossg., Fl. Kavk. III, 197. — *C. sanguinea* Pall. Fl. Ross. I (1784) 50, p. p.; M. B. Fl. taur.-cauc. 1, 112 (excl. syn.); C. A. M. Enum. pl. cauc.-casp. (1831) 51, p. p.; Ldb. Fl. Ross. II, 378, p. p., non L. — *C. sanguinea* var. *australis* Koehne, Dendr. (1893) 437; Shmal'g., Fl. I, 432; Vol'f and Palib., Der. i kust. 329; Medved., Der. i kust. Kavk. 3rd ed. (1919) 175. — *Svida australis* Pojark. ex Grossh., Opred. rast. Kavk. (1949) 205. — Ic.: C. K. Schn. l. c. f. 209c. — Exs.: G. R. F. No. 972; Dörfler, Herb. norm. No. 4339.

Shrub or small tree 2–4 m high, with broad, slightly drooping crown and green shoots densely beset with appressed, bipartite hairs when young, becoming purple later; old branches brownish-gray, longitudinally rugose or more or less verrucose from corklike outgrowths; petioles 0.7–2(2.5) cm long, appressed-hairy; leaves 2.2–9.5 cm long, 1.2–6 cm wide, bright green

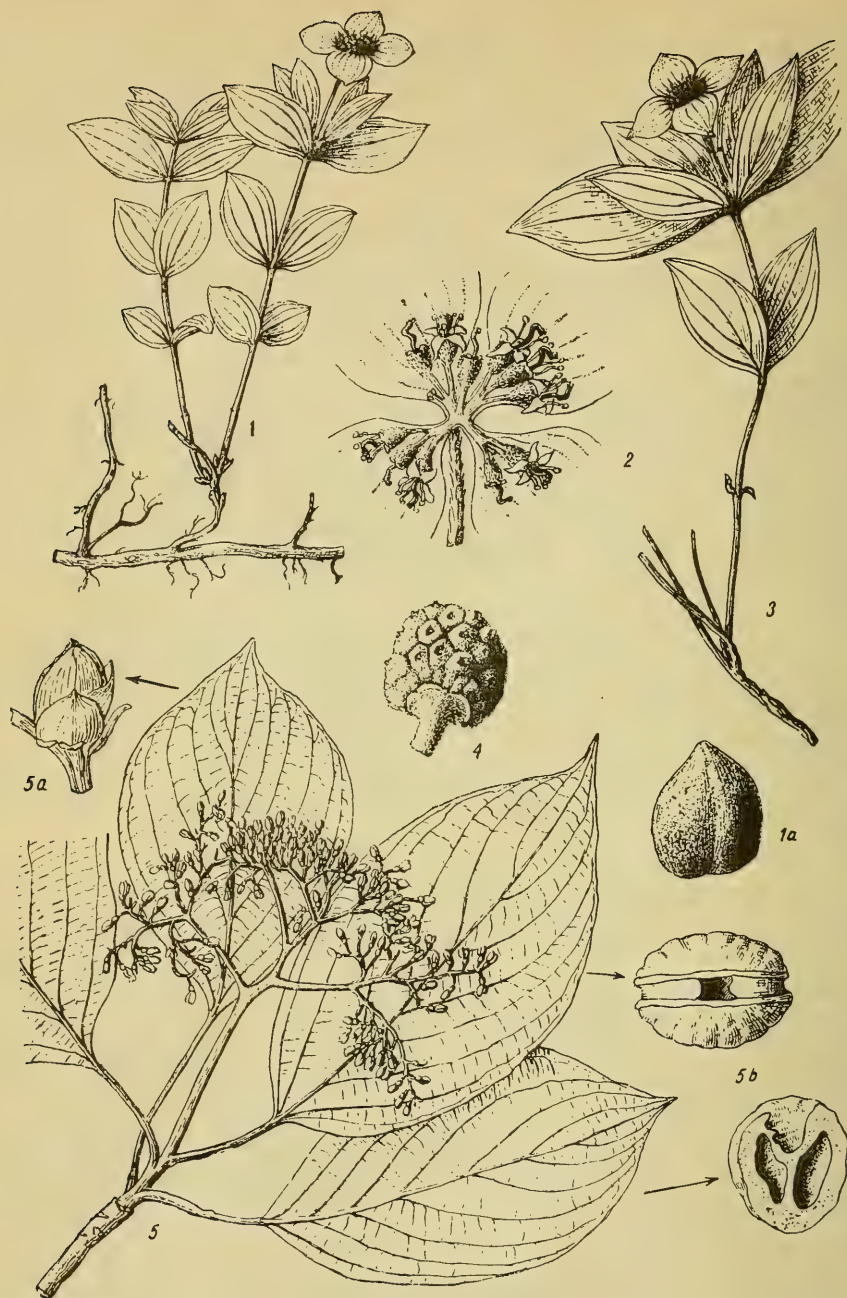


PLATE XXV. 1 — *Chamaepericlymenum suecicum* (L.) Graebn.; 1a, stone of fruit; 2 — *Ch. canadense* (L.) Graebn., inflorescences; 3 — *Ch. unalaschkense* (Ldb.) Rydb; 4 — *Cynoxylon capitata* (Wall.) Nakai, compound fruit; 5 — *Botrocaryum controversum* (Hemsl.) Pojark, 5a, bud, 5b, stone from above and in cross section.

above, paler beneath, both surfaces scabrous, covered with appressed, short, bipartite hairs, sometimes subglabrous at the end of summer, elliptic or
338 ovate-elliptic, rarely ovate, usually with rounded, rarely broadly cuneate, often second base, and short-acuminate or rounded apex, abruptly tapering to short mucro, sometimes, especially on long sterile shoots, leaves elongate (twice as long as wide), acuminate; lateral nerves 4–5 at each side, very rarely only small lowermost leaves of lateral shoots with 3 pairs of nerves, network of small nerves indistinct. Inflorescences flat or convex, 1.8–3.5 cm long, 3–6 cm wide, on 2–3 cm long stalks, densely covered, like branches of inflorescences and pedicels, with appressed hairs mixed with spreading ones; pedicels 3–7 mm long; ovary gray, entirely covered with appressed hairs; calyx-teeth 0.3–0.8(1) mm long, broad- or oval-triangular, rarely oval-lanceolate, with appressed hairs on the outside, glabrous inside, usually as long as, sometimes shorter or slightly longer ($\frac{1}{3}$ – $\frac{1}{4}$) than disk; disk pulviniform, flat; petals 5.3–6 mm long, 2–2.3 mm wide at base, often broad-, rarely narrow-lanceolate, appressed-hairy outside; filaments 4–5.5 mm long, longer than style and usually shorter than (rarely as long as) petals; anthers 2–2.5 mm long; style 3.5–4.5 mm long, abruptly broadening at apex; stigma truncate; fruit globular, black, 5–9 mm across; stone 4–6 mm long, (4)5–7 mm wide, subglobular or slightly flattened, sometimes one or both ends acuminate. Fl. May–June, Fr. September.

Mountain forests and edges of mountain forests, ravines, banks of rivers and streams, slopes covered with thickets of trees and shrubs. — European part: L. V. (Kuma, Manych), Crim.; Caucasus: everywhere. Gen. distr.: Bal.-As. Min. (As. Min.), Arm.-Kurd. Described from the Caucasus. Type in Leningrad.

Economic importance: As in preceding species.

S. T. iberica (G. Woron.) Pojark. in Bot. mat. gerb. Bot. inst. AN SSSR, XII(1950) 172. — *Cornus iberica* G. Woron. in Tr. Bot. inst. AN SSSR, ser. 1, 1(1933) 220. — *Thelycrania australis* var. *iberica* K. Sanadze in Tr. Tbil. univ. XXIXa (1946) 39. — *Th. armassica* K. Sanadze, l. c. 40. — *Svida iberica* Pojark. ex Grossh., Opred. rast. Kavk. (1949) 205. — Ic.: Sanadze, l. c. tabl. on pages 42 and 43. — Exs.: Herb. Fl. Cauc. No. 578.

Shrub or small tree to 4 m, with subspherical crown; young shoots brownish-green, densely covered with appressed hairs, becoming subglabrous, 1-year old shoots brown; branches strongly branching; bark brownish gray
341 with longitudinal cracks; leaves 2.5–8 cm long, 1.1–3.5 cm wide, dense, dark green, shiny above, paler beneath, dull, both sides (more beneath) densely covered with short, appressed, bipartite hairs, sometimes becoming subglabrous above, distinctly scabrous beneath, oblong-elliptic, usually 2.5, rarely nearly 3 times or more, very rarely only twice as long as wide, long-, rarely short-acuminate, produced into mucro, usually with narrowly cuneate base, more or less gradually tapering to 6–15-mm long petioles; nerves usually 4 on each side, sometimes part of leaves with 3 pairs of nerves. Inflorescence slightly inflated, 1.7–2.5 cm long, 4–6 cm wide, their short pedicels 0.8–2 cm long; pedicels and branches of inflorescence densely covered with short appressed hairs mixed with spreading ones; pedicels 2.5–5 mm long; calyx-teeth oval-triangular or triangular, (0.8)1–1.8(2.5) mm long, 1.5–2.5(3) times as long as disk, appressed-hairy outside, glabrous

inside; disk flat; petals lanceolate or narrow-lanceolate, 5–6.5 mm long, 1.5–2 mm wide at base; filaments shorter than petals, about as long as style, 4–4.7 (5.2) mm long; anthers 2.5–3 (3.5) mm long; style expanding at apex, 4–4.5 (5) mm long, stigma flat; fruit black, globular, 6–8 mm across; stones globular or slightly flattened, 4.5–6.5 mm in all dimensions, smooth or with few faint furrows, without lateral meridional furrow. Fl. June, Fr. September.

Woody-shrubby thickets in central mountain belt. — Caucasus: E. Transc. (near Tbilisi, Gori), S. Transc. (S. Armenia, Karabakh). Endemic? Described from a living specimen [grown from seed] collected on Teletskii Range in the Tbilisi botanical garden. Type specimen in Leningrad.

Economic importance. As in preceding species.

Note. The small-leaved form (leaves 2.5–2.8 cm long, 1.1–1.3 cm wide), described from S. Armenia as *Cornus australis* var. *araratianii* Takht. (Zam. po sist. i geogr. r. Tbil. bot. inst. 9, 1940) and recognized by Grossgeim as *Svida araratianii* (A. takht.) Grossh. (Opred. rast. Kavk. 1949, 205), which the present author cannot accept, should presumably be referred to *T. iberica*. The reported combination of characters, i. e., subcoriaceous, acuminate leaves with 3 pairs of nerves, is more common to this latter species than to *T. australis*.

6. *T. meyeri* Pojark. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 172. — *Cornus sanguinea* C. A. M. Enum pl. cauc.-casp. (1831) 51, 342 pro parte; Karel. in Bull. Soc. Nat. Mosc. XII, 156; Ldb. Fl. Ross. II, 378, p. p.; Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII, 105; Buhse, Fl. d. Alburs, 641; Lipsk., Lesn. rast. Turkest. 27, non L. — *Cornus australis* C. A. M. in Ann. sc. Nat. 3 sér. IV (1845) 74, p. p.; in Mém. Acad. Sc. Pétersb. 6 ser. VII. 2, 211, p. p.; Boiss. Fl. or. II, 1092, p. p.; Wanger. in Pflanzennr. IV, 129, 74, p. p. — *C. sanguinea* var. *australis* O. et B. Fedtsch., Perech. rast. Turk. 3–4 (1909) 641, non Koehne. — *C. meyeri* Pojark. olim in sched. — *Svida meyeri* Pojark. ex Grossh., Opred. rast. Kavk. (1949) 729. — Ic.: Poyarkova, l. c. fig. 2. — Exs.: Sintenis, It. transcasp.-pers. No. 1526.

Shrub; small tree, with rounded crown; young shoots green, with dense, appressed, bipartite hairs, becoming dull purple, old branches strongly branching, grayish brown, longitudinally rugose, with longitudinal corklike striae; leaves with petioles $\frac{1}{5}$ to $\frac{1}{8}$ length of blade, 3.5–9 cm long, 1.3–4.5 cm wide, smaller only at base of lateral branches, 2.5–3 cm long, thin, bright green above, paler beneath, both faces scabrous covered with short, appressed bipartite hairs, elongate-elliptic or oval-elliptic (2–2.5 times as long as wide), with cuneate or subrounded base and acuminate, very often long-acuminate apex, tapering to short mucro; lower leaves of shoots often with short-acuminate apex, abruptly tapering to mucro; lateral nerves 3–4 pairs, network of small nerves indistinct; petioles 6.5–14 mm long, densely appressed-hairy. Inflorescence on 0.7–3.5 cm long pedicels, convex, distinctly spreading at flowering, 2.5–3.5 cm long, 4–7 cm across, branches and pedicels densely covered with appressed hairs mixed with spreading ones; pedicels 2.5–5 mm long; ovary gray, entirely covered with appressed hairs; calyx-teeth triangular to lanceolate, 0.75–1.5, rarely to 2 mm long, 1.5–2.5 times as long as disk, hairy outside, glabrous inside; petals broadly lanceolate,

acute or obtuse, 5.5–7 mm long, 1.5–2.3 mm wide, base of dorsal side with short appressed hairs; filaments 4.5–6 mm long, shorter than petals, much longer than style; anthers 2–2.5 mm long; style 3.5–4(5) mm long, abruptly and shortly expanding near apex, with truncate yellow stigma; fruit black, globular, 6–7 mm across; stone distinctly flattened above and below, sometimes also slightly compressed laterally, 4–5 mm long, 4.5–5.5 mm across, with rather broad, sometimes deep, encircling, meridional furrow near suture; surface smooth or with few, indistinct furrows. Fl. June, Fr. September.

Floors and slopes of ravines, in thickets of shrubs and trees. — Caucasus: Tal.; Centr. Asia: Mtn. Turkm. (Kopet Dagh, only near Karakal).

343 Gen. distr.: Iran (Astrabad and all Elburz). Described from Ioldere gorge in W. Kopet Dagh. Type in Leningrad.

Economic importance. As in preceding 2 species.

Note. In such characters as the developed calyx-teeth, the paucity (3–4) of lateral nerves and narrow, acuminate leaves, *T. meyeri* more closely resembles *T. iberica* than *T. australis*, with which it was until recently united.

7. *T. darvasica* Pojark. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 177. — *Cornus darvasica* Pojark. in Sched.

High, branching shrub; young shoots with 4 weakly defined faces, green, densely appressed-hairy; annual branches brownish purple, old branches grayish brown; buds acute, appressed-hairy; leaves opposite, with canaliculate, hairy petioles, 0.8–1.5 cm long, rather thin, bright green above, paler beneath, both surfaces (slightly more so beneath) covered with rather thick, short, appressed, bipartite hairs, hence rather coarse to the touch, broad, ovate to subrounded, sometimes even expanding in width, rarely broadly elliptic, usually with truncate-rounded, rarely wide, cuneate base, rounded or short-acuminate, nearly always mucronate; lateral nerves 4–5 pairs, arcuately curved, slightly sunken above, prominent below; network of small nerves indistinct. Inflorescence dense, 2 cm long, 4 cm across, flat or slightly convex, on 1.6–3.5 cm long pedicels, branches of inflorescence and pedicels hairy, the latter 2.5–3 mm long (to 5 cm in fruit); ovary gray, densely appressed-hairy; calyx-teeth lanceolate, acute or acuminate, 0.75–1.3 mm long, 2–2.5 times as long as disk; petals lanceolate, long-acuminate, 5.5–6 mm long, 0.5–0.7 mm wide, outside with sparse appressed short hairs; stamens $\frac{2}{3}$ length of petals, filaments 3.5–4 mm long, anthers small, (1)1.3–1.5 mm long; style as long as stamens, clavate at apex; stigma truncate; disk pulviniform, flat above; fruit small, globular; stone slightly flattened above, 5–6 mm long, 5.5 mm across, with rather broad and deep encircling furrow along suture and well-defined nerves visible as fine, shallow furrows converging at poles. Fl. July, Fr. August–September.

Woody-shrubby thickets on slopes of gorges. — Centr. Asia: Pam.-Al. (Darvaz). Endemic. Described from near Kivron village (east of Kishlarg Kalai-Khumb). Type in Leningrad.

Note. Both from the botanical and the geographical point of view this is an interesting species, isolated in habit and area from the general distribution of the genus. Morphologically, it also offers some characters

344 which separate it from the species of the series Sanguineae, such as the shape of the style, apex and the very small anthers. In the development of the calyx-teeth, it most closely resembles the three southern species of the series (*T. cilicica*, *T. iberica* and *T. meyeri*).

Section 2. ALBIDAE (Wanger.) Pojark. comb. nov. — *Cornus* subgen. *Thelycrania* sect. *Amblycaryum* subsect. *Albidae* Wanger. in *Pflanzenr.* IV, 229 (1910) 53. — Style cylindrical, not broadening at apex. Fruit white or blue.

With the exception of *T. alba* (L.) Pojark., an American section. Of about 12 species, most are from N. America, 2 from Mexico.

Series 4. *Albae* Pojark. — Fruit distinctly flattened laterally; inflorescences flat, corymbiformly umbellate, with umbellate main axes and approximate, often also umbellate, axes of the higher orders. Disk large, pulviniform.

In addition to our *T. alba*, this series comprises two N. American species — *T. stolonifera* (Mchx.) Pojark. and *T. baileyi* (Coult. et Ev.) Pojark.

8. *T. alba* (L.) Pojark. in *Bot. mat. gerb. Bot. inst. AN SSSR*, XII (1950) 172. — *Cornus alba* L. Mant. I (1767) 40, p. p.; Pall. *Fl. Ross.* I, 50, s. str.; Ldb. *Fl. alt.* I, 149; *Fl. Ross.* II, 379; Turcz. *Fl. baic.-dah.* I, 517; Kom., *Fl. Man'chzh.* III, 182. — *C. tatarica* Mill. *Gard. dict.* ed. VIII (1768) No. 7; Fedch. and Fler., *Fl. Evr. Ross.* 710; Kom. and Alis., *Opred. r. Dal'nevost. kr.* II, 829; Kryl., *Fl. Zap. Sib.* VIII, 2085; Maevsk., *Fl. Sr. Ross.* (1940) 558. — *C. sanguinea* Pall. *Fl. Ross.* I (1784) 50, p. p.; Ldb. *Fl. alt.* I, 149; *Fl. Ross.* II, 379, p. p. (quoad pl. ural. et sibir.); Kryl., *Fl. Alt.* II, 545, non L. — *C. sibirica* Lodd. in Loud. *Hort. Brit.* (1830) 50; C. A. M. in *Ann. sc. nat.* 3 sér. IV, 61; in *Mém. Acad. Sc. Pétersb.* 6 sér. VII, 2, 206; Kryl., *Fl. Alt.* I, c. — *C. purpurea* Tausch in *Flora*, XXI (1838) 731. — *C. albavar. sibirica* Lodd. in Loud. *Arb. Brit.* ed. 2, II (1844) 1012. — *C. tatarica* var. *sibirica* Koehne, *Deutsch. Dendr.* (1893) 436. — *C. albassp. tatarica* Wanger. in *Pflanzenr.* IV, 229 (1910) 55. — *C. subumbellata* Komatsu in Matsum. *Icon. pl. Koish.* II (1914) 55, t. 113; Makino et Nemoto, *Fl. Jap.* (1925) 437, ed. 2 (1931) 854. — *C. alba* var. *rutokensis* Miyabe et Miyake, *Fl. Saghal.* (1915) 205. — *C. rutokensis* Miyabe et Miyake, l. c. in nota. — Ic.: Pall. *Fl. Ross.* I tab. 34; Syreishch., *Fl. Mosk. gub.* II, Figure at right on page 430; Nakai, *Fl. sylv. koreana*, XVI, tab. 24; Sugawara, III, *fl. Saghal.* III, tab. 654. — Exs.: G. R. F. No. 1221.

345 Shrub, 1.5–3 m high, root producing a small sucker when mature; stems thin, to 4 cm across; branches long, flexible, usually erect, only in old individuals sometimes bent toward ground, not rooting; young and older shoots usually dark red (this form is sometimes determined as *Cornus sibirica* Lodd.), sometimes black-red (*f. kesselringii* (E. Wolf) Pojark. comb. nov. — *C. sibirica* v. *kesselringii* Wolf), rarely red-brown or even brownish yellow (*f. chrysoclada* Pojark.), with

large white lenticels; leaves on 0.5–1.5 cm petioles, dark green, with sparse, appressed, bipartite hairs above, paler, glaucous, with more or less dense appressed bipartite hairs beneath, in the vicinity of nerves, often over entire surface with simple curly spreading and longer hairs beneath, elliptic or ovate-elliptic to broadly ovate, with rounded or cuneate base and acute or more or less long-acuminate apex, 2–10 mm long, 1–7 cm wide, lateral nerves 4–6 pairs, network of small nerves visible on both sides. Inflorescences flat or slightly inflated, 3–5 cm across, corymbiform, dense by virtue of axes of the last order ("pedicels"), approximate, often nearly umbellate, on 2–4 cm pedicels; axes thin, to 10 mm long, like other axes and inflorescence stalks covered with appressed hairs, mixed with long, rufous, curly hairs or even completely villous-hairy; ovary gray, covered with thick appressed hairs; calyx-teeth indistinct or very short, broadly triangular; petals oval-lanceolate, long-acuminate, obtuse, 4–5 mm long, 1.5–2 mm wide in their lower part; stamens distinctly longer than petals, to twice as long as style; fruit bluish at first, bluish-white to white when ripe, usually oblong, juicy, ca. 8 mm long; stone 5–6 mm long, markedly flattened, oblique, usually distinctly elongate, rarely as long as wide, with longitudinal oblique striae. Fl. from June nearly over entire summer or with second flowering in the fall, Fr. from August. (Plate XXIV, Figure 3.)

Banks of rivers and streams, shrubby thickets along their islands, with other shrubs in flooded forests, never forming thickets on its own. — European part: Dv.-Pech., U. V., V.-Kama; W. Siberia: to 64°30' N., everywhere; E. Siberia: everywhere; Far East: Ze.-Bu., Uda, Uss., Sakh. Gen. distr.: Mong. (northern part), Jap., N. Korea, Manchuria, NE Ch. Described from Siberia. Type in London.

Economic importance. A widely cultivated ornamental shrub. Several forms with variegated leaves are known: f. *argenteomarginata* (Rehd.) Pojark. comb. nov., with white-bordered leaves, f. *kernii* (E. Wolf) Pojark. comb. nov. (*Cornus sibirica* var. *kernii* E. Wolf.), with yellow-spotted leaves, f. *gouchaultii* (Carr.) Pojark. comb. nov., with variegated leaves, with a yellowish white or pink tinge, f. *spaethii* (Wittm.) Pojark. comb. nov., with leaves having broad golden yellow margins or entirely golden yellow.

Note. At present this species is listed in Soviet literature under three names — *Cornus tatarica* Mill., *C. sibirica* Lodd. and *C. alba* L. Linnaeus classed specimens of two closely related vicarious species from Siberia and Canada as *C. alba* L. Pallas (1789) first applied Linnaeus' name to the Siberian species which he described at great length and depicted in a colored plate. Hence, most taxonomists accepting Linnaeus' epithet "alba" for the Siberian species are absolutely right. The American species has long been known as *Cornus stolonifera* Mchx. or *Svida stolonifera* (Mchx.) Rydb.

★ *T. stolonifera* (Mchx.) Pojark. in Bot. mat. gerb. Bot. inst. AN SSSR, XII (1950) 165. — *Cornus alba* L. Mant. I (1767) 40 p. p.; Lam. Encycl. méth. II (1786) 115, p. p. C. A. M. in Ann. Sc. Nat. 3 sér. IV (1845) 60. — *Cornus stolonifera* Mchx. Fl. Bor. Am. I (1803) 92; Britt. a. Brown, III. Fl. North Un. St. Canada, ed. 2, II (1913) 662. — *C. sanguinea* Marsh. Arb. amer. (1785) 36, non L. — *C. nelsoni* Rose Contr. U. St.

herb. VIII (1903-1905) 54. — *Svida stolonifera* Rydb. in Bull. Torr. Bot. Club. 31 (1904) 572. — *Ossea instolonea* Nieuwl. et Lunell ex Lunell in Am. Midl. nat. 4 (1916) 487. — Ic.: Syreishch., Fl. Mosk. gub. II (1907) fig. at left on p. 430; Britt. a. Brown l. c. fig. 3185.

Shrub to 3 m high, producing abundant root suckers, branches shiny, usually bright red, rarely yellow (*f. flaviramea* (Rchb.) Pojark. comb. nov.), long, bent to ground and rooting; leaves usually elliptic, acuminate at both ends, rarely ovate, bright green above, whitish beneath, with very short bipartite hairs (much shorter than in *T. alba*), often mixed with simple spreading ones. Inflorescences usually appressed-hairy, rarely more or less villous-hairy; calyx-teeth distinct, acute; fruit usually globular, ripe fruit white or bluish; stone less compressed laterally than in *T. alba*, usually widening, rarely globular or slightly elongate. Fl. from June nearly continuously until fall, Fr. at end of August. (Plate XXIV, Figure 4.)

More widely cultivated in gardens and parks in the European part of the USSR, W. Siberia and Centr. Asia than *T. alba*. — Gen. distr.: N. Am. — Newfoundland to the Yukon, in the south to California and Virginia; coastal shrubby thickets on damp soil. Described from Canada. Type not known.

347 **Economic importance.** The most popular species of *Thelycrania* in the gardens and parks of the USSR. The formation of root suckers makes it useful for stabilizing slopes.

Genus ★ **AUCUBA*** Thbg.

Thbg. Diss. nov. gen. III (1783) 61

Flowers unisexual, dioecious; petals 4 with valvate aestivation; staminate flowers with 4 stamens of short, fleshy filaments and broadly ellipsoid dorsifixed anthers without rudimentary ovary; pistillate flowers with oblong, 1-locular ovary without staminodia; style short; stigma thick, oblique, capitate; ovule single, thick-stalked; fruit bacciform, single seed with scarious coat; embryo small, at apex of large endosperm, with small cotyledons. Small evergreen trees or shrubs, with dichotomously branching branches and opposite, thickish, coriaceous leaves. Inflorescences terminal, paniculate, with opposite branches.

Three species, one each in the Himalayas, China, Japan and Korea.

★ *A. japonica* Thbg. Diss. nov. gen. III (1783) 61; Fl. Jap. (1784) 4 et 64, tab. 12-13. — *Eubasis dichotoma* Salisb. Prodr. (1796) 68. — Ic.: E. u. P. Pflanzenfam. III, 8 (1898) f. 85; Pflanzenr. IV, 229 (1910) fig. 10; C. K. Schn. Laubholz. II (1909) fig. 302 l-o, 303 a-f.

Shrub, rarely small tree, with stems to 15 cm across; branches green, turning brownish gray, sparsely hairy at first, becoming glabrous; petioles 2-3(5) cm, distinctly expanding at base, 3-20 cm long, 1-12 cm wide, linear-lanceolate and lanceolate to ovate-elliptic, fleshy-coriaceous, shiny above, dull beneath, green often with yellow or white spots, mature leaves glabrous,

* Japanese name of *A. japonica* Thbg.

acute or acuminate with rounded or cuneate base, entire or more or less remotely dentate, with thick midrib, with sunk lateral veins and faint network of small nerves. Inflorescences pyramidal-paniculate, their branches opposite, dichasially branching, with lanceolate small leaves below; staminate inflorescences larger than the pistillate; staminate flowers on 3–5 mm pedicels, ebracteate, abscissing; calyx-teeth short; petals ovate- or lanceolate-elliptic, with small notch 3.5–4.5 mm long, reflexed; stamens much shorter than petals; disk flattened, slightly tetrahedral, fleshy; pistillate flowers on stalks jointed with pedicels, 2–3 mm long, with 2 bracts at point of articulation; ovary oblong, oval-cylindrical; calyx-teeth broadly triangular; petals as in staminate flowers; style shorter than petals, thick, glabrous; stigma oblique; fruit ellipsoid, juicy, red, yellow or white to 2 mm long, 5–7 mm across.

Widespread houseplants, also suitable for cultivation in the open along the Black Sea coast of the Crimea and Caucasus. Gen. distr.: Jap. and S. Korea. Described from Japan.

Economic importance. An ornamental shrub by virtue of its shiny, often variegated leaves and brightly colored fruits.

DIAGNOSES PLANTARUM NOVARUM
IN TOMO XVII FLORAE URSS COMMEMORATARUM

(DIAGNOSES OF NEW SPECIES MENTIONED IN VOLUME XVII)

Junio 1951

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CONIOSELINUM Fisch.

1. *C. boreale* Schischk. sp. nova.

Perenne; radix ad 1 cm crassa, erecta vel adscendens, collum residuis fibrosis brunneis foliorum tectum; tota planta glaberrima, interdum violaceo colorata; caulis 30—60 cm altus, simplex vel subramosus, tenuiter sulcatus; folia ambitu late triangularia; radicalia et caulina inferiora in petiolis 7—13 cm longis basi abrupte in vaginam dilatatis, lamina late triangularia 10 cm longa ac lata, tripinnata; lobi ultimi lineares, 0.5—2 cm longi et 1—2 mm lati; folia caulina media minora, suprema — sessilia in vagina dilatata et reclinata. Umbellae 7—10-radiatae, radiis subaequalibus in latere interiore vix scabridulis, in diametro 3—4 cm; foliola involucri deficientia vel foliorum unicum lineare cito deciduum adest; umbellulae in diametro 1 cm; foliola involucelli 5—7, anguste linearia, interdum filiformia, umbellulam subaequantia, dentes calycini inconspicui; petala alba, exteriora usque ad 2 mm accrescentia, apice emarginata et hic lobulo involuto munita; fructus oblongi, 5—6 mm longi et 2.5—3 mm lati, jugis dorsalibus anguste alatis, marginalibus latiuscule alatis, alis 0.75—1 mm latis; stylopodium applanatum, styli ab initio recti breves, postea 1—1.5 mm longi, declinati.

Typus. Karelo-finskaja SSR, insula Jaroslavov, sinus Czupa, in ripa lapidosa maritima, 4 VIII 1925, fl., Zinserling; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Valde affine *C. longifolio* Turcz. sed radiis umbellae 7—10 (nec 10—15) in latere superiore indistincte asperulis (nec acute asperulis), foliolis involucelli filiformibus vel anguste linearibus marginibus non scariosis sat differt.

2. *C. Victoris*¹ Schischk. sp. nova.

Perenne; radix 5—7 mm crassa, verticalis vel ascendens; caules solitarii, raro duo, cum foliis glaberrimi, vulgo simplices, 15—40 cm alti; folia radicalia numerosa, pinnata, ambitu oblonga, petiolis longis lamina duplo-triplo longioribus, basi abrupte in vaginam dilatatis; lamina bi—trijuga, foliolis ovatis vel late ovatis marginibus inaequaliter dentatis, 2—3 cm

¹ Nomen in honorem scrutatoris diligentissimi Florae Orientis Extremi Victoris Vassiljevii datum.

* [This appendix has been reproduced photographically from the Russian original.]

352 longis et 1—2 cm latis supra saturate viridibus, subtus pallidioribus, foliola terminalia, interdum lateralialia, trisecta vel tripartita; folium caulinum unicum (saepe caulis aphyllus) radicalibus simile, sed minus. Umbellae 7—15-radiatae, radiis subaequalibus in parte interiore scabridis, in diametro 2—5 cm, involucrum nullum; umbellulae in diametro ad 1.5 cm, radiolis tenuiter scabridulis, foliola involucelli 5—7, anguste linearia, acuminata, marginibus scariosa ciliolataque, umbellulam subaequantia, frequenter violaceo-colorata; fructus fere rotundati, a dorso vix compressi, jugis dorsalibus alatis, alis lateralibus latioribus; stylopodium breviter conicum, styli reflexi stylopodio multo longiores.

Typus. Oriens extremus, prov. Ochotsk. In laricetis in valle fluminis Tauja, 27 VII 1930, fl. M. Semenov-Tjanschansky; in herb. Inst. bot. nom. Komarovii Ac. Sc. URSS conservatur.

Affine est *C. vaginato* sed foliis simpliciter pinnatis et lobis ultimis atioribus statim dignoscitur.

ANGELICA L.

3. *A. amurensis* Schischk. sp. nova. — *A. anomala* auct. fl. Orientis extremi, non Lalle.

Perennis; caulis ramosus 80—200 cm altus, intus inanis, glaber, tantum pedunculi sub umbellis usque ad internodium superum breviter pubescentes; folia radicalia 40 cm longa et 30 cm lata bipinnata; folia caulina in petiolis lamina brevioribus, bipinnata, lobis ultimis (foliolis) ovatis 3—10 cm longis et 1.5—5 cm latis, infimis petiolulatis interdum basi segmentis 1—2 munitis vel sessilibus, suprema decurrentia, acuta, marginibus dentata, dentibus inaequalibus anguste triangularibus acuminatis sursum vergentibus, supra fuscoviridia venis scabridulis, subtus pallidiora venis glaberrimis, folia summa in petiolo membranacei-inflato limbo reducto vel subnullo. Umbellae 20—40-radiatae in diametro 10—20 cm, radiis puberulis, involucrum nullum; umbellulae 30—40-florae, radiolis breviter pubescentibus; foliola involucelli 5—7, lineari-lanceolata, late membranacea, saepe violaceo colorata, vix pubescentia, cito decidua; petala alba ad 1 mm longa apice non profunde emarginata; fructus late ovati vel subrotundi 5 mm longi, 4 mm lati; mericarpii jugis dorsalibus tribus elevatis lateralibus late alatis; valleculae univittatae, vittae totam superficiem inter jugis impletae; stylopodium breviter conicum; styli reflexi stylopodio 1.5—2-plo longiores.

Typus. Prov. Chabarovsk, in quercetis prope pag. Venjukova. 2 IX 1928, fr. V. N. Vassiljev; in herb. Leninopol. conservatur.

Nostra species valde affinis *A. sachalinensi* Maxim., sed foliis involucelli glabris vel vix puberulis (nec pubescentibus), venis paginae superioris breviter scabridulis (nec glabris) differt.

4. Sect. **Stenophyllum** sect. nov. — Fructus oblongi vel ovati, marginibus anguste alati, juga dorsalia filiformia vix prominentia; lobi ultimi foliorum oblongi vel lanceolati, 2—5 cm longi et 0.5—1.5 cm lati; vaginae foliorum superiorum cylindrico-oblongae extus tenuiter velutinae.

Species duo: *A. anomala* Lall. et *A. jaluana* Nak.

ARCHANGELICA Hoffm.

5. *A. Komarovii* Schischk. sp. nova.

Perennis; caulis glaber, ramosus, costatus, intus inanis, 80—150 (200) cm alt.; folia radicalia in petiolis longis basi in vaginam abrupte dilatatis, ternatim pinnata, lobi primarii petiolulati, lobi ultimi sessiles vel breviter petiolulati, utroque latere venis glaberrimis, ovati, 10—20 cm longi et 5—9 cm lati, superiores vulgo decurrentes; folia superiora biternata in vagina inflata glabra vel indistincte scabridula sessilia; folia suprema usque ad vaginam inflatam reducta. Umbella principalis 25—40-radiata, in diametro 15—20 cm, radiis scabridulis vel subglabris; umbellae laterales minores; involucrum nullum; umbellulae multiflorae in diametro 1.5—2.5 cm, radiolis glabris; foliola inuolucelli 8—13 lineari-lanceolata, fere tota scariosa, acuminata marginibus ciliolata radiolis multo breviora; petala albo virescentia, apice integra, breviter acutata, ad 1 mm longa; ovaria et fructus immaturi pilosiusculi, stylopodia pulviniformia, styli initio erecti divergentes, postea reflexi; fructus late ovati, 7 mm longi et 5 mm lati, jugis dorsalibus anguste alatis, alis lateralibus latioribus.

T y p u s. Asia media. Montes Zeravschanici, ad ripam lacus Iskanderkul. 1893, V. Komarov; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Nostra species valde affinis *A. decurrenti* Ldb. sed radiis umbellarum subglabris vel vix scabridis (nec pubescentibus) dignoscitur.

PEUCEDANUM L.

6. *P. luxurians* Tamamsch. sp. nova.

Perenne; radix crassa, collum fibris foliorum emortuorum diu persistentibus involucreto; caules numerosi teretes sulcati ramosi, inferne foliosi superne vaginas tantum ferentes, 1—1.5 m alti; folia praecipue radicalia longe petiolata, ambitu triangularia, in lacinias longissimas rigidas triternatim secta, caulina inferiora consimilia, superiora valde diminuta, suprema ad vaginas lanceolatas acuminatas reducta. Foliola usque ad 7—8 cm lg. et 1 mm lata, subtus trinervia. Umbellae 20—40-radiatae ad ramulos depauperatae, radii inaequilongi; involucrum polyphyllum, phyllis lineari setaceis inaequalibus deflexis. Umbellulae 20—30-florae, involucelli phylla setacea pedicellis breviora; dentes calycini triangulares, petala flavo-virentia postea flava. Stylopodia subcompressa, styli breves et rigidi. Fructus maturi ignoti.

354 *Typus.* Transcaucasia. Terter, Isty-su, in pratis subalpinis, 28 VII 1929, fl. L. Utkin; in Herb. Universitatis Mosquensis conservatur.

Habitu appropinquat ad *P. ruthenicum* M. B., sed radiis umbellae numerosioribus, umbellulis magis multifloris et lobis ultimis segmenta foliorum angustioribus differt.

7. *P. songoricum* Schischk. sp. nova.

Perenne, tota planta glabra; radix 2—3 cm crassa, collum residuis fusco-brunneis foliorum emortuorum tectum; caulis tenuiter sulcatus, simplex vel in parte superiore parum ramosus, 60—70 cm altus; folia radicalia in petiolis longis, multoties ternatim secta, lamina ambitu triangularis, 12—15 cm longa et 10—12 cm lata, lobi ultimi lineares, 1—4 cm longi et 1 mm lati, rigidi, apice acuminati; folia caulina inferiora minora et minus secta, superiora in vagina oblonga sessilia laminis valde reductis. Umbella principalis 11—15-radiata, in diametro 5—6 cm; radiis inaequalibus glabris, umbellis lateralibus minoribus; involucrium nullum vel mono vel diphyllum, phyllis cito deciduis; umbellulae in diametro 6—10 mm, foliola involucelli 5—7 lineari subulata, radiolis multo breviora; dentes calycini conspicui triangulares; petala viridula vel ochroleuca apice vix emarginata, ad 1.5 mm longa; stylopodium conicum, styli erecti vel divergentes, stylopodio breviores.

Typus. Kazachstan. In jugo Dshungarski Alatau, montes Bajan-Dshurjuk, 3 VII 1909, fl. Lipsky; in Herb. Inst. bot. nom. V. Komarovii Ac.Sc. URSS conservatur.

Valde affine *P. taurico* M. B. sed umbellis 11—15-radiatis (nec 17—20) et involucro nullo (nec 3—5-phylo) distinguitur.

8. *P. borysthenicum* Klok. in Voznachn. Roslin Ukr. (1950) 298.

Perenne; radix 1 cm crassa, collum residuis fusco-brunneis foliorum emortuorum dense tectum; caulis erectus, rotundus ramosus, tenuiter costatus, glaber, 60—150 cm altus; folia radicalia in petiolis lamina brevioribus, lamina late triangularis, 30—40 cm longa et 20—30 cm lata, triternatim secta, lobi primarii et secundarii petiolulati, lobi ultimi lineares vel lanceolati 0.5—3.5 cm longi et 0.6—1.7 mm lati apice breviter albo-mucronulati, marginibus glabri vel vix scabriduli. Umbellae 7—10-radiatae, in diametro 4—10 cm, tempore fructificationis contractae, radiis inaequalibus glabris; foliola involucelli 1—5, lanceolata vel linearia anguste albo-marginata, sursum vergentia; umbellulae ad 8 mm in diametro, foliola involucelli 5—7, lineari-lanceolata, radiolis breviora, dentes calycini late triangulares, acuti subindistincti; petala viridi-albicantia, vix emarginata, in lacinulam inflexam coarctati; fructus late ovati, 6—10 mm longi et 5—7.5 mm lati, jugis dorsalibus filiformibus, lateralibus usque ad 1 mm dilatatis, pedicelli fructu duplo breviores.

355 Typus. Ucraina, prope oppidum Dnepropetrovsk, in arenosis ad ripam fl. Borysthenis, fr. 20 VIII 1901. I. Akinfiev; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Appropinquat ad *P. arenarium* Waldst. et Kit. sed umbellis 7—10-radiatis nec 5—7, radiis fructiferis contractis distinguitur.

9. Sectio **Jurineoidea** Schischk. sect. nova. — Dentes calycini vix conspicui, petala lutea; fructus late obovati, juga dorsalia filiformia, lateralialia late alata, valliculae 1—3-vittatae; folia superiora ad vaginam reducta, involucrum nullum, foliola involucelli lineari-lanceolata.

Species unica (*Peucedanum paucifolium* Ldb.) Transcaucasiae orientali et australi atque prov. Talyschensi propria.

10. Sectio **Feruloidea** Schischk. sect. nov. — Dentes calycini triangulares, petala ochroleuco-viridiuscula; flores polygami; fructus ovato-elliptici, jugis dorsalibus filiformibus, lateralibus vix dilatatis.

Species unica (*Peucedanum Adae* Woron.) Transcaucasiae occidentali (Abchasiae) propria.

11. Sectio **Glaucoselinum** Schischk. sect. nov. — Dentes calycini triangulares, obtusi; petala late ovoidea, vix emarginata, lutea; fructus ovoidei, juga dorsalia filiformia, lateralialia vix dilatata; folia ternatim-pin-nata, lobis ultimis ovatis parvulis; involucra et involucella nulla.

Species unica (*Peucedanum transiliense* Herd). montibus Asiae Mediae propria.

OEDIBASIS K.-Pol.

12. **Oe. karatavica** Korov. sp. nova.

Perennis; tuber oblongum, integrum vel lobatum; caulis 40—50 cm altus, a medio vel supra basin ramosus, tenuiter sulcatus; folia radicalia numerosa diu non marcescentia, breviter petiolata, circuitu ovato-lanceolata, tripinnata, lobis ultimis filiformibus, erectis, mucronulatis, 6 mm longis; folia caulina minora triangularia, lobis ultimis 20 mm longis; folia suprema ad vaginas reducta. Umbellae 8—11-radiatae, radiis 6 cm longis, foliola involucri 3, linearia; umbellulae 20-florae, foliola involucelli 10, linearia, acuta, pedicellis aequalia; petala subrotundata, apice profunde emarginata, 1.9 mm longa; stylopodium breviter conicum, styli 2 mm longi; fructus (immaturi) lineares, apice incrassati, 0.4 cm longi, juga valde prominula, marginibus mericarpii dilatatis, vittae latae.

Typus. Asia media. Montes Karatau; in Herb. Univers. As. Med. conservatur.

Species haec affinis est *Oe. apiculatae* (Kar. et Kir.) K.-Pol., sed glabritia totae plantae et lobis ultimis foliorum filiformibus 20 mm longis, statim dignoscitur.

13. Sect. **Euplatytaenia** Schischk. sect. nova. — Ovaria et fructus pubescentes.

14. **P. depauperata** Schischk. sp. nova.

Radix crassa, multiceps; caules numerosi vel subsolitarii, pilis brevissimis rigidiusculis vestiti, ramis paucis oblique adscendentibus, 20—40 cm alti; folia radicalia numerosa, circuitu oblongo-lineararia, 4—25 cm longa et 0.5—2 cm lata, foliolis 2—5-paribus, ovatis, marginibus inciso-dentatis, sessilibus vel breviter petiolulatis; folia caulina pauca minora; folia suprema cum lamina valde reducta. Umbellae 2—5-radiatae, radiis inaequalibus pubescentibus, in diametro (tempore florendi) 1—2 cm, foliola involucri 2—5, lanceolata, acuminata, membranaceo-marginata, puberula radiis multo breviora; umbellulae parvae, in diametro ad 0.5 cm foliola involucelli 5, foliolis involucri similia; dentes calycini vix conspicui, petala tota homomorpha flavido-viridula, ad 1 mm longa; ovaria et fructus juveniles dense albo-tomentosi; stylopodium breviter conicum; styli reflexi 1—1.5 mm longi; fructus maturi ignoti.

Typus. Kirgizia. Montes Tjan-schan. Ad ripas fl. Kiczik-Usengusch 4 km supra ostium. In clivis herbosis lapidosisque, fl. et fr. juven. 1 IX 1939. V. Jakovleva.

Appropinquit ad *P. pimpinelloidem* Nevski sed petalis externis non accrescentibus, caulibus foliisque vix hirsutiusculis.

15. **P. bucharica** (Fedtsch.) Schischk. sp. nova. — *Malabaila bucharica* Fedtsch. in Sched. ad Herb. Leninopol.

Radix crassa, multiceps, collum residuis atrobrunneis foliorum emortuorum vestitum; caules praecipue in parte inferiore pilis albidis rigidiusculis deorsum vergentibus densiuscule tecti, 50—60 cm alti, superne ramosi; folia radicalia mox marcescentia, caulina inferiora oblonga, petiolis dimidio laminae subaequalibus munita; lamina ob pubescentiam densam grisea, bipinnata vel pinnata, 10 cm longa et 4 cm lata; foliola quinque-paria breviter petiolulata pinnatifida, lobulis late ovoideis marginibus dentatis, paribus inferioribus a caeteris remotis, e foliolis minoribus grosse inaequaliter dentatis constituentibus. Umbellae 12—25-radiatae, radiis inaequalibus hirsutis, in diametro 3—7 cm, involucri foliola 5, lanceolato-lineararia dense pubescentia, albomarginata; umbellulae parvulae in diametro 3—5 mm radiolis inaequalibus pubescentibus; foliola involucelli 5, lineari-lanceolata, puberula umbellulae subaequalia; fructus late ovati, 3.5 mm longi et 3 mm lati, jugis dorsalibus acutis, lateralibus dilatatis marginibus anguste indistincte incrassatis, valleculae univittatae, commissura bivittata.

357 Typus. Asia Media. Tadzhikistania, Jakkabag. 19 VI 1891, fl. et fr. V. Lipsky; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Non dissimilis est *P. pimpinelloidi* Nevski sed umbellis 12—25 (nec 3—7) statim dignoscitur.

16. **P. Komarovii** (Manden.) Schischk. comb. nova. — *Tordyliopsis Komarovii* Manden. in litteris.

Perennis; planta ad 1 m alta, caule cylindrico glabro vel pilis brevibus tenuibus sparsis obsito; folia pinnata 5—6-juga, segmentis sessilibus ambitu ovatis inaequaliter plus minusve incisis, margine acute dentatis, supra glabris, subtus sparsissime minute puberulis, vaginis haud dilatatis anguste et membranaceo-marginatis, folia summa diminuta segmentis elongatis interdum subintegra. Umbellae (10) 16—18-radiatae, umbellarum umbellularumque radii molliter et plus minus dense patule pubescentes, involucri foliola numerosa lanceolato-linearia, pubescentia, foliola involucelli praecedentibus conformia, umbellulas floriferas aequantia, flosculi albi, dentes calycini valde inaequales 1—2 lanceolati longi, ceteri breviter triangulares inconspicui, petala marginalia valde acuta profunde biloba, lobis latis; antherae luteae; mericarpia ovalia 9 mm lg., 6 mm lata, sparse minuteque puberula vel glabra, basin versus subangustata, vittae dorsales mericarpii basin fere attingentes, vallecule medianas fere implentes, commissuralia dorsalibus subaequilata, recta, valde approximata, stylopodio late-conico, styli disco 3—4-plo longiores.

Typus. Asia media. In jugo inter fl. Muran et Kzyl-su, in declivio occidentali montis Karimdzag 27 VII 1932 leg. Gonczarov, Grigoriev et Nikitin; in Herb. Inst. Bot. nom. V. L. Komarovii Ac. Sc. URSS conservatur.

Affinis est *P. heterodontae* Korov., sed foliolis majusculis 2—8 cm longis ac latis statim dignoscitur. (Descriptio Mandenoviae).

17. Sect. **Pseudoplatytenia** Schischk. sect. nova. — Ovaria et fructus glaberrimi.

18. **P. Rubtzovii** Schischk. sp. nova.

Perennis; caulis erectus, angulato-costatus, molliter floccoso-pubescent, ramosus, 50—60 cm altus; folia radicalia longe petiolata, oblonga, bipinnata, 10—15 cm longa et 2 cm lata, molliter pubescentia, lobi ultimi 2—5 mm longi et 1 mm lati, acutiusculi; folia caulina minora et in vagina dilatata sessilia. Umbellae 7—13-radiatae, radiis inaequalibus, in diametro 2.5—8 cm; foliola involucri involucellique 5—7, lanceolata, acuminata, marginibus late membranacea, erecta, dense et breviter puberula; umbellulae in diametro ad 1.2 cm, radiolis pubescentibus; dentes calycini breviter triangulares; petala sulfureo-albida, cacumine involuto praedita, dorso violascentia et molliter puberula, exteriora valde accrescentia; fructus elliptici, 6—7 mm longi et 5 mm lati, glabri; mericarpii juga dor-

358 *salia filiformia*, acutiuscula; vittae in valleculis latae, commissura bivittata, vittis approximatis.

Typus. Kasachstania. Montes Dzhungarski Alatau. Ditis Dzarkent, in faucibus Taldy-bulak; fr. 18 VII 1937, N. Rubtsov et O. Linczevski; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS conservatur.

Appropinquat ad *P. bucharicam* (Fedtsch.) Schischk. sed umbellis 7—13-radiatis (nec 12—25), ovarii fructibusque glaberrimis (nec hirsutis) petalis exterioribus valde radiantibus statim dignoscitur.

19. **SCAPHOSPERMUM** Korov. gen. nov.

Flores hermaphroditi vel polygami; dentes calycini inconspicui; petala flavida, apice integra cum lobulo inflexo; stylopodium breviter conicum, styli reflexi stylopodio longiores; fructus ovati, jugis acutis prominentibus, superficies inter juga rugosa, valleculae univittatae, commissura bivittata; endospermum planum.

Genus monotypicum Tadjikistaniae australis montanae proprium.

A proximo genere *Silao* Bernh. valleculis univittatis, fructuum superficie rugosa differt.

20. **S. asiaticum** Korov. sp. nova.

Perenne; radix verticalis vel adscendens, 0.8 cm crassa; collum residuis fibrosis brunneis foliorum emortuorum dense tectum; caulis vulgo solitarius, glaber, tenuiter costatus, intus inanis, ramosus 50—100 cm altus; folia radicalia cito emarcida, bi- vel tripinnata ambitu late ovata, 15—25 cm longa et 10—15 cm lata, petiolis brevibus basi in vaginam amplexicaulem late scarioso-marginatam abrupte abeuntibus; lobi primarii inferiores longe, medii breviter petiolulati, supremi—sessiles, ambitu oblongi, toti pinnatim secti, lobi secundarii ovati, sessiles vel subsessiles in lobulos oblongos paucae ac obtusiuscule dentatos, 10—15 mm longos et 5—10 mm latos incisi; folia caulina pauca, radicalibus similia, sed minora, folia suprema ad vaginas oblongas reducta. Umbellae 6—8-radiatae, in diametro 6—9 cm, radiis glaberrimis, involucrum et involucellum nulla, umbellulae 15—20-florae, in diametro 1 cm; petala ad 1 mm longa, ovata; fructus 6—7 mm longi ac 4 mm lati.

Typus. Asia minor. Tadjikistania australis, ditio Dushty-dzum, montes Farkan, trajectus Siun, in rupestribus ad pag. Parvar, alt. 1650—1850 m, fl. 24 VI 1935. J. Linczevsky; in Herb. Inst. bot. nom. V. Komarovii Ac. Sc. URSS. conservatur.

21. **PILOPLEURA** Schischk. gen. novum.

Calycis dentes lanceolati, acuti; petala albida, subrotunda, extus pubescentia; fructus ovati, a dorso compressi, hirsuti, juga dorsalia meri-

359 carpiorum prominentia, lateralia margine dilatato contigua. Vittae in val-
leculis solitariae, commissura plana bivittata. Planta perennis foliis subbipin-
natis brevissime hirsutiusculis, involucris involuceliisque polyphyllis.

Toto habitu admonet *Libanotidem* L., sed fructibus a dorso com-
pressis, margine dilatato complanato cinctis differt, a *Peucedano* L. fruc-
tibus pilosis et jugis dorsalibus prominentibus dignoscitur.

Specie unica in montibus Tjan-schanj occidentalis endemica: *P. Koso-
Poljanskii* Schischk. nom. nov. [= *Peucedanum dasycarpum* Rgl. et
Schmalh. (1877), non Torr. et Gray (1840).]

22. **SAPOSHNIKOVIA** Schischk. gen. nov.

Flores hermaphroditi; dentes calycini breviter triangulares; petala
alba, glaberrima, late-ovalia, apice obtusa integra; ovarium plicis albi-
dis transversis dense obtectum, demum gradatim obliteratis, fructus ovati
a dorso vix compressi, mericarpia jugis prominulis acutis univittatis, valle-
culae latae univittatae, commissura bivittata; endospermium facie commissu-
rali planum; stylopodium conicum, styli ab initio recti, demum reclinati
stylopodio aequales. Herbae perennes, caulibus a basi ramosissimis ramis
divaricatis foliis bi-vel tripinnatis.

Genus novum affine ut videtur *Laseri* Borkh., sed fructibus imma-
turiis plicis albidis transversis dense tectis et jugis primariis vittiferis sat
differt.

Genus monotypicum Sibiriae orientali, Orienti Extremi, Mongoliae,
Manshuriae et Koreae proprium.

Species unica: *Saposhnikovia divaricata* (Turcz.) Schischk.

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Amaranthaceae Juss.	VI, 354	Hippuridaceae DC.	XV, 668
Anacardiaceae Lindl.	XIV, 518	Hydrocaryaceae Raimann	XV, 637
Anonaceae Dunal.	VII, 567	Juglandaceae Lindl.	V, 247
Aquifoliaceae DC.	XIV, 539	Lauraceae Lindl.	VII, 571
Araliaceae Vent.	XVI, 1	Leguminosae Juss.	XI, XII et XIII t.
Aristolochiaceae Blume	V, 431	Linaceae Dumort.	XIV, 84
Balsaminaceae S. F. Gray	XIV, 624	Loranthaceae D. Don	V, 406
Berberidaceae Torr. et Gray.	VII, 539	Lythraceae Lindl.	XV, 525
Betulaceae A. C. Agardh	V, 252	Magnoliaceae J. St. Hil.	VII, 564
Buxaceae Dumort.	XIV, 503	Malvaceae Juss.	XV, 23
Callitrichaceae Lindl.	XIV, 495	Meliaceae Vent.	XIV, 244
Capparidaceae Lindl.	VIII, 1	Menispermaceae DC.	VII, 560
Caryophyllaceae Juss.	VI, 386	Moraceae Lindl.	V, 376
Celastraceae Lindl.	XIV, 546	Myricaceae Lindl.	V, 242
Ceratophyllaceae A. Gray.	VII, 14	Myrtaceae Pers.	XV, 554
Chenopodiaceae Less.	VI, 2	Nyctaginaceae Lindl.	VI, 370
Chloranthaceae Blume	V, 20	Nymphaeaceae DC.	VII, 2
Cistaceae Lindl.	XV, 327	Nyssaceae Endl.	XVII, 315
Combretaceae R. Br.	XV, 554	Onagraceae Lindl.	XV, 565
Cornaceae Link	XVII, 315	Oxalidaceae Lindl.	XIV, 76
Crassulaceae DC.	IX, 8	Papaveraceae B. Juss.	VII, 573
Cruciferae B. Juss.	VIII, 14	Phytolaccaceae Lindl.	VI, 372
Cynomoriaceae Engl.	XV, 670	Pittosporaceae Lindl.	IX, 270
Datisceae Lindl.	XV, 479	Platanaceae Lindl.	IX, 274
Droseraceae DC.	IX, 1	Polygalaceae Lindl.	XIV, 246
Elaeagnaceae Lindl.	XV, 515	Polygonaceae Lindl.	V, 442
Elatinaceae Lindl.	XV, 259	Portulacaceae Lindl.	VI, 376
Empetraceae Lindl.	XIV, 511	Proteaceae J. St. Hil.	V, 405
Eucommiaceae Van-Tiegh.	IX, 273	Punicaceae Horan.	XV, 553
Euphorbiaceae J. St. Hil.	XIV, 266	Rafflesiaceae Dumort.	V, 441
Fagaceae A. Br.	V, 319	Ranunculaceae Juss.	VII, 20
Frankeniaceae DC.	XV, 271	Resedaceae DC.	VIII, 606
Geraniaceae J. St. Hil.	XIV, 1	Rhamnaceae R. Br.	XIV, 634
Guttiferae Juss.	XV, 201		

Rosaceae Juss.	IX, 279; X	Theaceae D. Don	XV, 197
Rutaceae Juss.	XIV, 198	Thelygonaceae Eichl.	VI, 371
Salicaceae Lindl.	V, 21	Thymelaeaceae Adans.	XV, 481
Santalaceae R. Br.	V, 412	Tiliaceae Juss.	XV, 1
Sapindaceae Juss.	XIV, 623	Tropaeolaceae Juss.	XIV, 83
Saururaceae Lindl.	V, 20	Ulmaceae Mirb.	V, 360
Saxifragaceae DC.	IX, 134	Umbelliferae Moris.	XVI, 36; XVII
Simarubaceae Lindl.	XIV, 241	Urticaceae Endl.	V, 384
Staphyleaceae DC.	XIV, 577	Violaceae Juss.	XV, 350
Sterculiaceae Schott et Endl.	XV, 185	Vitaceae Lindl.	XIV, 674
Tamaricaceae Lindl.	XV, 276	Zygophyllaceae Lindl.	XIV, 146
Ternstroemiaceae R. Br.	XV, 197		

VEGETATION REGIONS OF THE USSR

Abbreviated name	Full name
I. Arctic	
1. Arc. Eur.	Arctic (European part)
2. Nov. Z.	Novaya Zemlya
3. Arc. Sib.	Arctic (Siberia)
4. Chuk.	Chukchi
5. An	Anadyr
II. European part	
6. Kar.-Lap.	Karelia-Lapland
7. Dv.-Pech.	Dvina-Pechora
8. Balt.	Baltic States
9. Lad.-Ilm.	Ladoga-Il'men
10. U. V.	Upper Volga
11. V.-Kama	Volga-Kama
12. U. Dnp.	Upper Dnieper
13. M. Dnp.	Middle Dnieper
14. V.-Don.	Volga-Don
15. Transv.	Transvolga area
16. U. Dns.	Upper Dniester
17. Bes.	Bessarabia
18. Bl.	Black Sea area
19. Crim.	Crimea
20. L. Don	Lower Don
21. L. V.	Lower Volga
III. Caucasus	
22. Cisc.	Ciscaucasia
23. Dag.	Dagestan
24. W. Transc.	Western Transcaucasia
25. E. Transc.	Eastern Transcaucasia
26. S. Transc.	Southern Transcaucasia
27. Tal.	Talysh
IV. West Siberia	
28. Ob	Ob region (from the eastern slopes of the Urals to the Yenisei River)
29. U. Tob.	Upper Tobol
30. Irt.	Irtysk
31. Alt.	Altai

V. East Siberia	
32. Yenisei.	Yenisei
33. Lena-Kol.	Lena-Kolyma
34. Ang.-Say.	Angara River-Sayans
35. Dau.	Dauria
VI. Far East	
36. Kamch.	Kamchatka
37. Okh.	Okhotsk
38. Ze.-Bu.	Zeya-Bureya
39. Uda.	Udar River area
40. Uss.	Ussuri
41. Sakh.	Sakhalin
VII. Soviet Central Asia	
42. Ar.-Casp.	Aral-Caspian
43. Balkh.	Lake Balkhash area
44. Dzu-Tarb.	Dzungaria-Tarbagatai
45. Kyz. K.	Kyzyl-Kum
46. Kara K.	Kara-Kum
47. Mtn. Turkm.	Mountainous part of Turkmenistan
48. Amu D.	Amu Darya
49. Syr D.	Syr Darya
50. Pam.-Al.	Pamir-Alai
51. T. Sh.	Tien Shan
Accepted Regions for Indication of General Distribution of Species Appearing in "Flora of the U. S. S. R."	
I. Arc.	Arctic (Spitsbergen, Greenland and farther)
II. Scand.	Scandinavia (Norway, Denmark, Sweden, Finland)
III. Centr. Eur.	Central Europe (Germany, Poland Czechoslovakia, Hungary, Austria, Switzerland)
IV. Atl. Eur.	Atlantic Europe (Netherlands, Belgium, Britain, France, Portugal)
V. Med.	Mediterranean (including North Africa)
VI. Bal.-As. Min.	Balkan Peninsula and Asia Minor
VII. Arm.-Kurd.	Lesser Armenia and Kurdistan
VIII. Iran	Iran and Afghanistan
IX. Ind.-Him.	India and Himalayas
X. Dzu.-Kash.	[Dzungaria-Kashgar area] Eastern or Chinese Turkestan (Sinkiang)
XI. Mong.	Mongolia
XII. Jap.-Ch.	Japan and China
XIII. Ber.	North American coast of the Bering Sea
XIV. N. Am.	North America (U. S. A. and Canada)
XV. Tib.	Tibet

Other Geographical Abbreviations

Afr.	Africa
Aust.	Australia
Centr.	Central
E.	East(ern)
Gr.	Great, Greater
I.	Island
Is.	Islands
Mt.	Mountain
Mts.	Mountains
N.	North(ern)
R.	River
S.	South(ern)
W.	West(ern)

TRANSLATOR'S NOTE

1. The Russian term "Srednyaya Aziya" is, in English, Central Asia (or Soviet Central Asia). Therefore the term Middle Asia has been used for Russian "Tsentral'naya Aziya," which is non-Soviet inner Asia, comprising western China (Sinkiang and Tibet) and Mongolia.

2. According to Russian usage, the European part of the USSR is "eastern Europe." Therefore "western Europe" includes the whole of Europe outside the USSR.

EXPLANATORY LIST OF ABBREVIATIONS OF
RUSSIAN INSTITUTIONS AND PERIODICALS
APPEARING IN THIS TEXT

Abbreviation	Full name (transliterated)	Translation
Bot.-Geogr. issled. v Turkest	Botaniko-geograficheskie issledovaniya v Turkestane	Botanical and Geographical Investigations in Turkestan
Bot. Mat. Gerb. Bot. inst. AN SSR	Botanicheskie Materialy Gerbariya Botaniche- skogo instituta AN SSSR	Botanical Materials of the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR
Bot. Mat. Gerb. Gl. Bot. Sada	Botanicheskie Materialy Gerbariya Glavnogo Botanicheskogo Sada	Botanical Materials of the Herbarium of the Main Botanical Gardens
Bot. zap. SPb. univ.	Botanicheskii zapiski Sankt-Peterburgskogo universiteta	Botanical Notes of St. Petersburg University
Bot. zhurn. SSSR	Botanicheskii zhurnal SSSR	Botanical Journal of the USSR
Byull. Glavn. Bot. Sada	Byulleten' Glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Byull. Obshch. lyubit. estest- vozn., antrop. i etnogr.	Byulleten' Obshchestva lyubitelei estestvoz- naniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Byull. Voronezh. obshch. estestv.	Byulleten' Voronezh- skogo obshchestva estestvoispytatelei	Bulletin of the Voronezh Society of Naturalists
Dendr.	Dendrarii	Arboretum
Der. ikust	Derev'ya i kustarniki	Trees and Shrubs
Der. ikust. Kavk.	Derev'ya i kustarniki Kavkaza	Trees and Shrubs of the Caucasus
Dikie polezn. i tekhnich. rasteniya SSSR	Dikie poleznye i tekhnicheskieskie rasteniya SSSR	Useful Wild Plants and Industrial Crops of the USSR
Dikorastushchie r. Kavkaza, ikh rasprostranenie, svoistva i primeneniye	Dikorastushchie rasteniya Kavkaza, ikh rasprostraneniye, svoistva i primeneniye	Wild Plants of the Caucasus, Their Distribution, Properties and Uses
Dokl. AN Azerb. SSR	Doklady Akademii Nauk Azerbaidzhanskoi SSR	Reports of the Academy of Sciences of the Azerbaidzhan SSR

Fl.	Flora	Flora
Fl. Abkh.	Flora Abkhazii	Abkhasian Flora
Fl. Almat.	Flora Alma-Atinskogo	Flora of the Alma-Ata
Zapovedn.	Zapovednika	Reserve
Fl. Alt.	Flora Altaya	Altai Flora
Fl. Alt. i Tomsk.	Flora Altaiskoi i	Flora of Altai and Tomsk
gub.	Tomskoi gubernii	Provinces
Fl. Az. Ross.	Flora Aziatskoi Rossii	Flora of Asiatic Russia
Fl. Evrop. Rossii	Flora Evropeiskoi Rossii	Flora of European Russia
Fl. Gruzii	Flora Gruzii	Georgian Flora
Fl. Kamch.	Flora Kamchatki	Kamchatkan Flora
Fl. Kavk.	Flora Kavkaza	Caucasian Flora
Fl. Man'chzh.	Flora Man'chzhurii	Manchurian Flora
Fl. Mosk. gub.	Flora Moskovskoi	Flora of Moscow Province
	gubernii	
Fl. Poles'ya	Flora Poles'ya	Flora of Polesie
Fl. Sev. Kraya	Flora Severnogo Kraya	Flora of the Northern
		Territory
Fl. Sakh.	Flora Sakhalina	Flora of Sakhalin
Fl. Sib.	Flora Sibiri	Siberian Flora
Fl. Sib. i Dal'n.	Flora Sibiri i Dal'nego	Flora of Siberia and the
Vost.	Vostoka	Far East
Fl. Sr. i Yuzhn.	Flora Srednei i Yuzhnoi	Flora of Central and
Ross.	Rossii	Southern Russia
Fl. Sr. Ross.	Flora Srednei Rossii	Flora of Central Russia
Fl. Tadzhik.	Flora Tadzhikistana	Flora of Tadzhikistan
Fl. Talysh.	Flora Talysha	Talysh Flora
Fl. Tsentr.	Flora Tsentral'nogo	Flora of Central Kazakh-
Kazakhst.	Kazakhstana	stan
Fl. Vost. Evr.	Flora Vostochnoi	Flora of East European
Ross.	Evropeiskoi Rossii	Russia
Fl. Yugo-Vost.	Flora Yugo-Vostoka	Flora of Southeast
Fl. Yugo-zap.	Flora Yugo-zapadnoi	Flora of Southwest Russia
Ross.	Rossii	
Fl. Yur. Bot.	Flora Yur'evskogo	Flora of Yur'ev Botanical
sada	botanicheskogo sada	Garden
Fl. Zap. Sib.	Flora Zapadnoi Sibiri	Flora of West Siberia
Gerb. donsk. fl.	Gerbarii donskoi flory	Herbarium of Don Flora
Gerb. Orlovsk.	Gerbarii Orlovskoi	Herbarium of Orel Province
gub.	gubernii	
Gerb. Ukr. fl.	Gerbarii Ukrainskoi flory	Herbarium of Ukrainian Flora
GRF	Gerbarii Russkoi flory	Herbarium of Russian Flora
Ill. Fl. Mosk. gub.	Illyustrirovannaya Flora	Illustrated Flora of Moscow
	Moskovskoi gubernii	Province
Izv. AN SSSR	Izvestiya AN SSSR	Bulletin of the Academy of
		Sciences of the USSR
Izv. Bot. Sada	Izvestiya Botanicheskogo	Bulletin of the Botanical
	Sada	Gardens
Izv. Bot. Sada	Izvestiya Botanicheskogo	Bulletin of Peter the Great
Petra Vel.	Sada Petra Velikogo	Botanical Gardens

Izv. Gl. Bot. Sada	Izvestiya Glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Izv. Kavk. Muzeya	Izvestiya Kavkazskogo Muzeya	Bulletin of the Caucasian Museum
Izv. Kazakhst. fil. AN SSSR	Izvestiya Kazakhstanskogo Filiala Akademii Nauk SSSR	Bulletin of the Kazakhstan Branch of the Academy of Sciences of the USSR
Izv. Kievsk. Bot. Sada	Izvestiya Kievskogo Botanicheskogo Sada	Bulletin of the Kiev Botanical Gardens
Izv. Obshch. lyubit. estestvozn., antrop. i etnogr.	Izvestiya Obshchestva lyubitelei estestvoznaniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Izv. Obshch. Sadov.	Izvestiya Obshchestva Sadovodov	Bulletin of the Horticulturists' Society
Izv. Tadzhik. Bazy AN SSSR	Izvestiya Tadzhikskoi Bazy Akademii Nauk SSSR	Bulletin of the Tadzhikistan Base of the Academy of Sciences of the USSR
Konsp. rast. okr. Khar'kova	Konspekt rastenii okrug Khar'kova	Compendium of Plants of Kharkov District
Korm. rast. Estestv. senokosov i pastb. SSSR	Kormovye rasteniya estestvennykh senokosov i pastbishch SSSR	Fodder Plants of Natural Hay Meadows and Pastures of the USSR
Mat. (dlya) Fl. Kavk.	Materialy dlya Flory Kavkaza	Material on Caucasian Flora
Mat. (dlya) fl. Sredn. Azii	Materialy dlya flory Srednei Azii	Materials on Soviet Central Asian Flora
Mat. (dlya) Fl. stepei Kher'sonsk. Gub.	Materialy dlya Flory stepei Khersonskoi Gubernii	Materials on the Flora of Kherson Province Steppes
Nov. obozr.	Novoe obozrenie	New Review
Ob. rast. Kievsk. uch. okr.	Obzor rastitel'nosti Kievskogo uchebnogo okrug	Survey of Vegetation in the Kiev Educational District
Obz. Krym.-Kavk. Medicago	Obzor Krymsko-Kavkazskogo Medicago	Survey of Crimean-Caucasian Medicago
Och. obozr. i fl. Karpat	Ocherki rastitel'nosti i flory Karpat	Survey of Carpathian Vegetation and Flora
Ocherk. Tifl. fl.	Ocherki Tiflisskoi flory	Survey of Tiflis [Tbilisi] Flora
Opis. Amur. obl.	Opisanie Amurskoi oblasti	Description of the Amur Region
Opis. ist. razv. fl. vost. Tyan'-Shanya	Opisanie istorii razvitiya flory vostochnogo Tyan'-Shanya	Description of the History of the Development of Flora of the Eastern Tien Shan
Opis. nov. rast. Turk.	Opisanie novykh rastenii Turkestana	Description of New Plants of Turkestan
Opis. nov. vidov Opred. der. i kust.	Opisanie novykh vidov Opredelitel' derev'ev i kustarnikov	Description of New Species Key to Trees and Shrubs

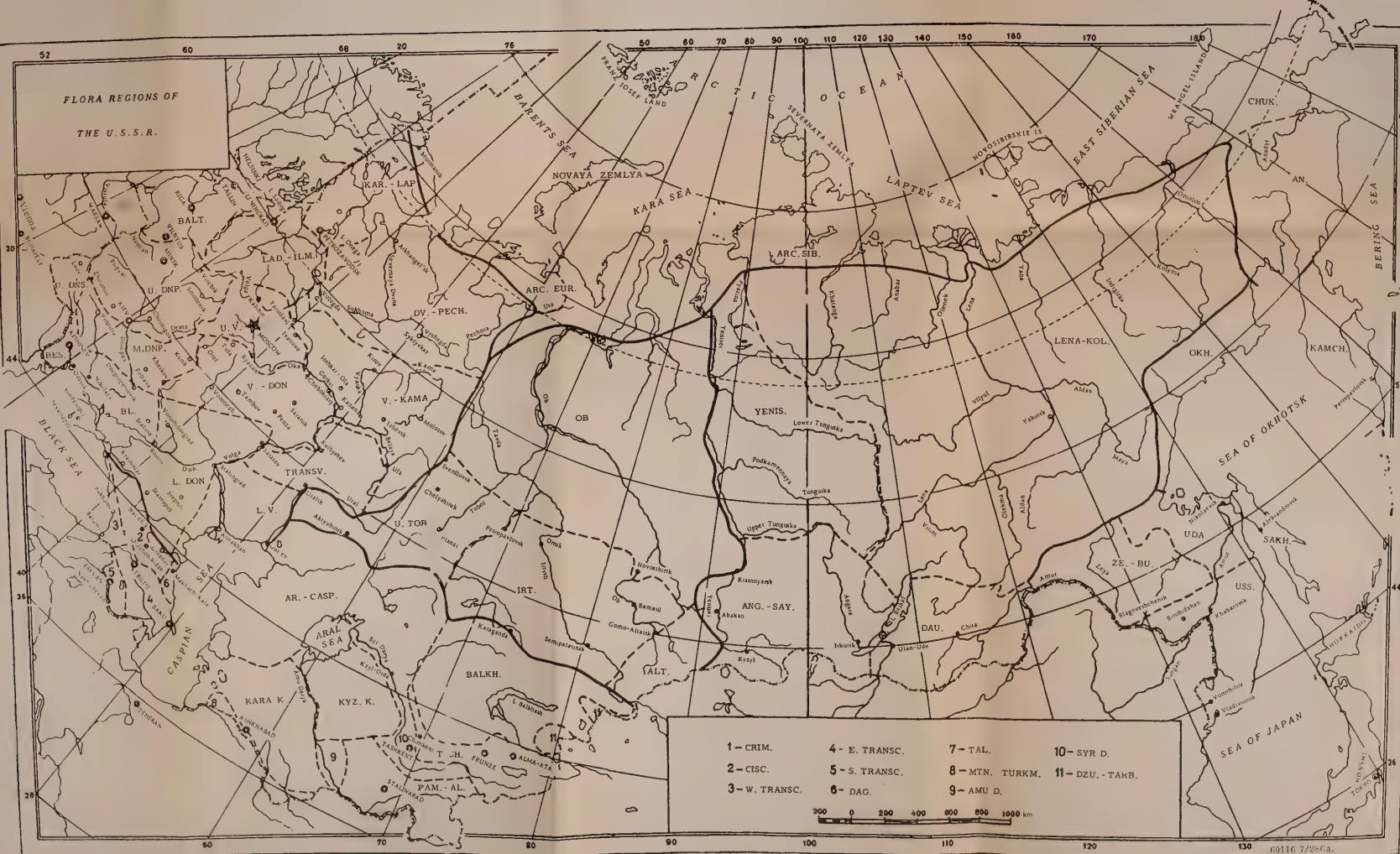
Opred. rast. Dal'nevost. kr.	Opredelitel' rastenii Dal'nevostochnogo kraya	Key to Plants of the Far Eastern Territory
Opred. rast. Kavk.	Opredelitel' rastenii Kavkaza	Key to Caucasian Plants
Opred. vyssh.	Opredelitel' vysshikh rastenii	Key to Higher Plants
Opred. (vyssh.) rasten. Evrop. chasti SSSR	Opredelitel' (vysshikh) rastenii Evropeiskoi chasti SSSR	Key to Higher Plants of the European USSR
Opyt Russko- Kavk. Fl.	Opyt Russko-Kavkazskoi Flory	Attempted Russian- Caucasian Flora
Perech. rast. Turk.	Perechen' rastenii Turkmenii	List of Turkmenian Plants
Pochv. eksped. v bass. r. Syr- Dar'i i Amu- Dar'i	Pochvennaya ekspeditsiya v basseiny rek Syr- Dar'i i Amu-Dar'i	Soil Science Expedition to the Syr-Darya and Amu- Darya River Basins
Priroda	Priroda	Nature
Protok. Zased. Kievsk. Obshch. Estestv.	Protokol Zasedaniya Kievskogo Obshchest- va Estestvoispytatelei	Protocol of a Conference of Kiev Naturalists' Society
Putesh.	Puteshestviya	Travels
Rast. i fl. Karpat.	Rasteniya i flora Karpat	Plants and Flora of the Carpathians
Rast. letn. pastb. Gandzh.	Rasteniya letnikh past- bishch Gandzhi	Vegetation of Gandzha [now Kirovabad] Summer Pastures
Rast. res. Turkm.	Rastitel'nye resursy Turkmenii	Plant Resources of Turk- menia
Rast. resursy Kavkaza	Rastitel'nye resursy Kavkaza	Plant Resources of the Caucasus
Rast. sib.	Rastitel'nost' Sibiri	Vegetation of Siberia
Rast. Sr. Az.	Rastitel'nost' Srednei Azii	Vegetation of Soviet Central Asia
Rast. Turkest.	Rastitel'nost' Turke- stana	Vegetation of Turkestan
Rast. Zakasp. obl.	Rastitel'nost' Zakaspi- skoi oblasti	Vegetation of the Trans- caspian Region
Rastit. Kavk.	Rastitel'nost' Kavkaza	Vegetation of the Caucasus
Rastit. pokrov. vost. Pamira	Rastitel'nyi pokrov vostochnogo Pamira	Plant Cover of the Eastern Pamirs
Rastit. syr'e Kazakhst.	Rastitel'noe syr'e Kazakhstana	Plant Resources of Kazakhstan
Rastit. zapovedn. Guralash i Zaaminsk. lesn. ugodii	Rastitel'nost' zapoved- nika Guralash i Zaaminskikh les- nykh ugodii	Vegetation of Guralash Reserve and Zaamin Forest Lands
Rezult' dvukh puteshestv. na Kavk.	Rezultaty dvukh putesh- estvii na Kavkaz	Results of Two Travels to the Caucasus

Russk. Fl.	Russkaya Flora	Russian Flora
Russk. lek. rast.	Russkie lekarstvennye rasteniya	Russian Medicinal Plants
Sbor, sushka i raz. lek. rast.	Sbor, sushka i razvitie lekarstvennykh rastenii	Gathering, Drying and Development of Medi- cinal Plants
Sorn. rast. SSSR	Sornye rasteniya SSSR	Weed Plants of the USSR
Sots. Rastenie- vodstvo	Sotsialisticheskoe Rastenievodstvo	Socialist Plant Growing
Sov. Bot.	Sovetskaya Botanika	Soviet Botany
Sov. Farmats.	Sovetskaya Farmatsevtika	Soviet Pharmaceutics
Spis. rast.	Spisok rastenii	List of Plants
Spis. Rast. Krymsk. Zapovedn.	Spisok Rastenii Krym- skogo Zapovednika	List of Plants of the Crimean Reserve
Tr. Bot. inst. AN SSSR	Trudy Botanicheskogo instituta AN SSSR	Transactions of the Bota- nical Institute of the Academy of Sciences of the USSR
Tr. Bot. Inst. Azerb. Filiala Akad. Nauk	Trudy Botanicheskogo Instituta Azerbaid- zhanskogo Filiala Akademii Nauk	Transactions of the Bota- nical Institute of Azer- baidzhan Branch of the Academy of Sciences
Tr. Bot. Sada	Trudy Botanicheskogo Sada	Transactions of the Bota- nical Gardens
Tr. Bot. Sada Yur'evsk. Univ.	Trudy Botanicheskogo Sada Yur'evskogo Universiteta	Transactions of the Bota- nical Gardens of Yur'ev [now Tartu] University
Tr. Byuro prikl. Bot.	Trudy Byuro po priklad- noi botanike	Transactions of the Bureau of Applied Botany
Tr. Dal'nevost. bazy AN SSR	Trudy Dal'nevostochnoi bazy AN SSSR	Transactions of the Academy of Sciences of the USSR
Tr. Inst. nov. lub. syr'ya	Trudy Instituta novogo lubyanogo syr'ya	Transactions of the Institute of New Fiber Raw Materials
Tr. Nauk.-Doslid. Inst. Bot. Khar. Derzh. Univ.	Trudy naukovо-doslid- noho instytutu botaniky Kharkivs'koho Derzhav- noho Universytetu	Transactions of the Botani- cal Research Institute of the Kharkov State University
Tr. Obshch. isp. prir. Khark'k. univ.	Trudy Obshchestva ispytatelei prirody Khar'kovskogo universiteta	Transactions of the Natural- ists' Society of Kharkov University
Tr. Obshch. sadov. v Odesse	Trudy Obshchestva sadovodov v Odesse	Transactions of the Odessa Horticulturists' Society
Tr. odessk. obsh. sadov.	Trudy odesskogo obshchestva sadovodov	Transactions of Odessa Horticulturists' Society
Tr. Peterb. obshch. estest- voisp.	Trudy Peterburgskogo obshchestva estest- voispytatelei	Transactions of St. Peters- burg Naturalists' Society

Tr. pochv.-bot. eksp. Peresl. upr.	Trudy pochvennobota- nicheskoi ekspeditsii Pereslavskogo upravleniya	Transactions of the Soil- Botanical Expedition of Pereslavl Administration
Tr. po geobot. obsled. pastb. Azerb.	Trudy po geobotaniche- skim obsledovaniyam pastbishch Azerbaidzhana	Transactions of Geobotanical Investigations of Azerbaidzhan Pastures
Tr. Odessk. otd. R. obshch. sadov	Trudy Odesskogo otdele- niya Rossiiskogo ob- shchestva sadovodov	Transactions of Odessa Branch of the Russian Horticulturists' Society
Tr. prikl. bot. (gen. i sel.)	Trudy po prikladnoi botanike, genetike i selektivnoi	Transactions of Applied Botany, Genetics and Selection
Tr. Ross. Obshch. sadov.	Trudy Rossiiskogo ob- shchestva sadovodov	Transactions of the Russian Horticulturists' Society
Tr. SAGU	Trudy Sredneaziatskogo Gosudarstvennogo Universiteta	Transactions of the Soviet Central Asian State University
Tr. Sarat. obshch. estestvoisp.	Trudy Saratovskogo obshchestva estest- voispytatelei	Transactions of the Saratov Naturalists' Society
Tr. Sil'skogospod. komit. bot.	Trudy sil'skohospodar'- skoho komiteta botaniky	Transactions of the Botanical Agricultural Committee
Tr. SPb. obshch. estestv.	Trudy Sankt-Peterburg- skogo obshchestva	Transactions of the St. Peters- burg Naturalists' Society
Tr. Tadzh. bazy AN SSSR	Trudy Tadzhikskoi bazy AN SSSR	Transactions of the Tadzhik- istan Base of the Academy of Sciences of the USSR
Tr. Tbil. bot. inst.	Trudy Tbilisskogo bota- nicheskogo instituta	Transactions of Tbilisi Botanical Institute
Tr. Tbil.(or Tifl.) bot. sada	Trudy Tbilisskogo (Tiflisskogo) botaniche- skogo sada	Transactions of the Tbilisi (Tiflis) Botanical Garden
Tr. Turkmensk. bot. sada	Trudy Turkmenskogo botanicheskogo sada	Transactions of the Turk- menian Botanical Garden
Tr. Turk. nauchn. obshch.	Trudy Turkmenskogo nauchnogo obshchestva	Transactions of the Turk- menian Scientific Society
Uchen. Zapiski Kazansk. Gos. Univ.	Uchenye Zapiski Kazan- skogo Gosudarstven- nogo Universiteta	Scientific Reports of the Kazan State University
Vest. Akad. Nauk. (or AN) Kazakhsk. SSR	Vestnik Akademii Nauk Kazakhskoi SSR	Bulletin of the Academy of Sciences of the Kazakh SSR
Vestn. estestv. nauk	Vestnik estestven- nykh nauk	Bulletin of Natural Sciences
Vestn. Ross. Obshch. sadov	Vestnik Rossiiskogo Obshchestva sadovodov	Bulletin of the Russian Horticulturists' Society
Vest. Tifl. bot. sada	Vestnik Tiflisskogo botanicheskogo sada	Bulletin of Tiflis Botanical Garden

Visn. Kyivsk. bot. sadu	Visnyk Kyivsk'koho botanichnoho sadu	Bulletin of the Kiev Botanical Garden
Vizn. (or Vznachn.) rosl. URSR	Viznachnyk roslyn URSR	Key to Plants of the Ukrainian SSR
V obl. polupustyni Yadov. rast. lugov i pastb.	V oblasti polupustyni Yadovitye rasteniya lugov i pastbishch	(In the) Semidesert Region Poisonous Plants of Meadows and Pastures
Yubil. sbornik V. L. Koma- rovu	Yubileinyi Sbornik Posvyashchennyi V. L. Komarovu	Jubilee Collection Dedicated to V. L. Komarov
Zam. po sist. i geogr. rast. Tbil. bot. inst.	Zametki po sistematike i geografii rastenii Tbilisskogo botaniche- skogo instituta	Notes on Taxonomy and Geography of Plants of the Tbilisi Botanical Institute
Zam. o Rast. Russk. Flory	Zametki o Rastenyakh Russkoi Flory	Notes on Plants of the Russian Flora
Zam. po fl. EL'T	Zametki po flore El'tona	Notes on the Flora of Elton
Zap. Kievsk. Obshch.	Zapiski Kievskogo Obshchestva Estest- voispytatelei	Reports of the Kiev Society of Naturalists
Zap. Kyivsk. Inst. Nar. Osv.	Zapysky Kyivsk'koho Instytutu Narodnoho Osvichennya	Reports of the Kiev Institute of Public Education
Zap. Nauchno- Prikl. Otd.	Zapiski Nauchno-Prik- ladnogo Otdeleniya Tiflisskogo Sada	Reports of the Applied Sciences Section of the Tiflis [Tbilisi] Botanical Garden
Zap. NOVO-ROSS. obshch. Estestv.	Zapiski Novorossiiskogo obshchestva Estest- voispytatelei	Reports of the Novorossiisk Society of Naturalists
Zap. Russk. geogr. obshch.	Zapiski Russkogo geo- graficheskogo obshchestva	Reports of the Russian Geographical Society
Zhurn. Bot. obshch.	Zhurnal Botanicheskogo obshchestva	Journal of the Botanical Society
Zhurn. opytn. agron. Yugo- Vost.	Zhurnal opytnoi agro- nomii Yugo-Vostoka	Journal of Experimental Agronomy of the Southeast

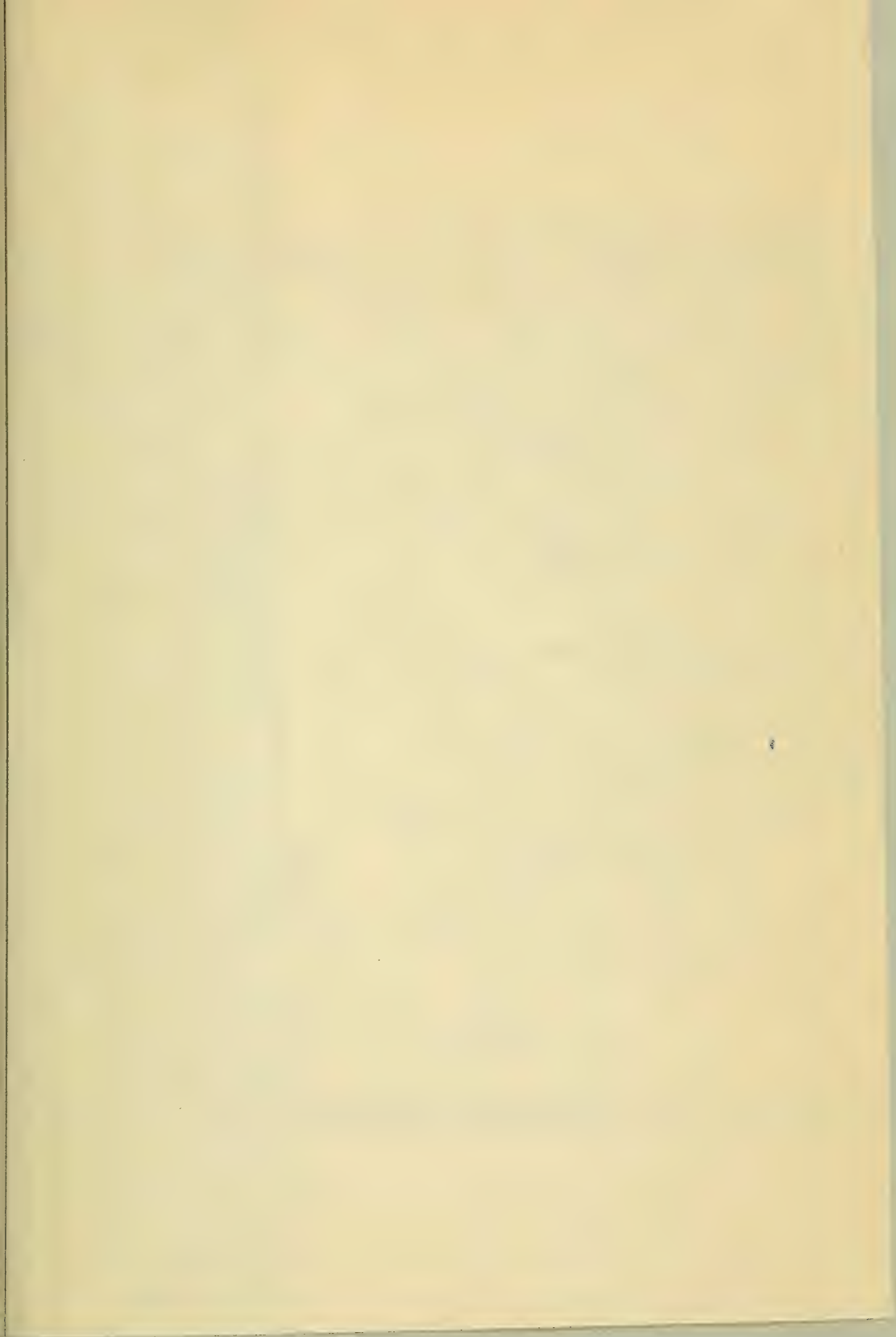
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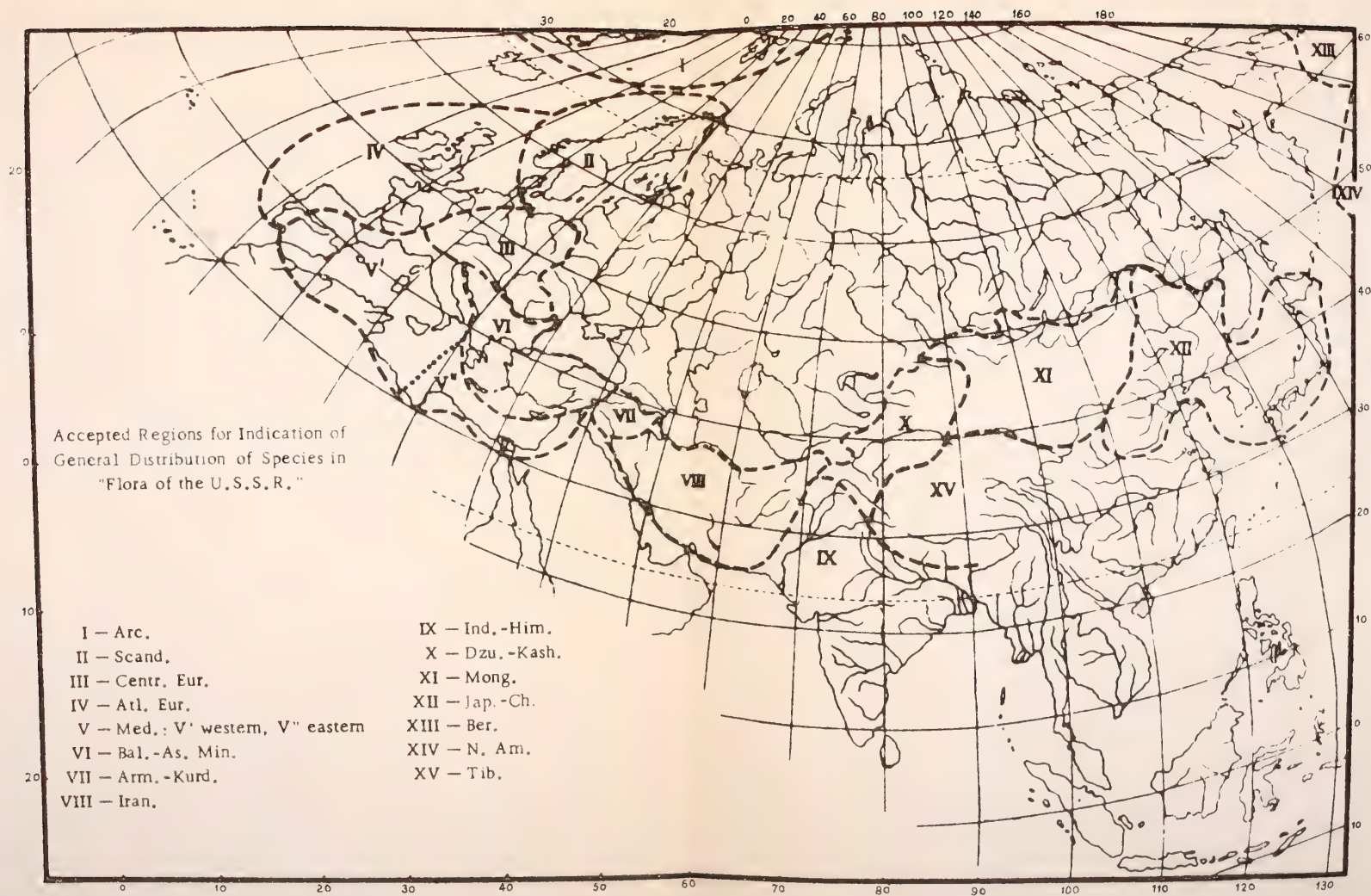


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| 2 - CISC. | 5 - S. TRANS. | 8 - MTN. TURKM. | 11 - DZU. - TAMB. |
| 3 - W. TRANS. | 6 - DAG. | 9 - AMU D. | |

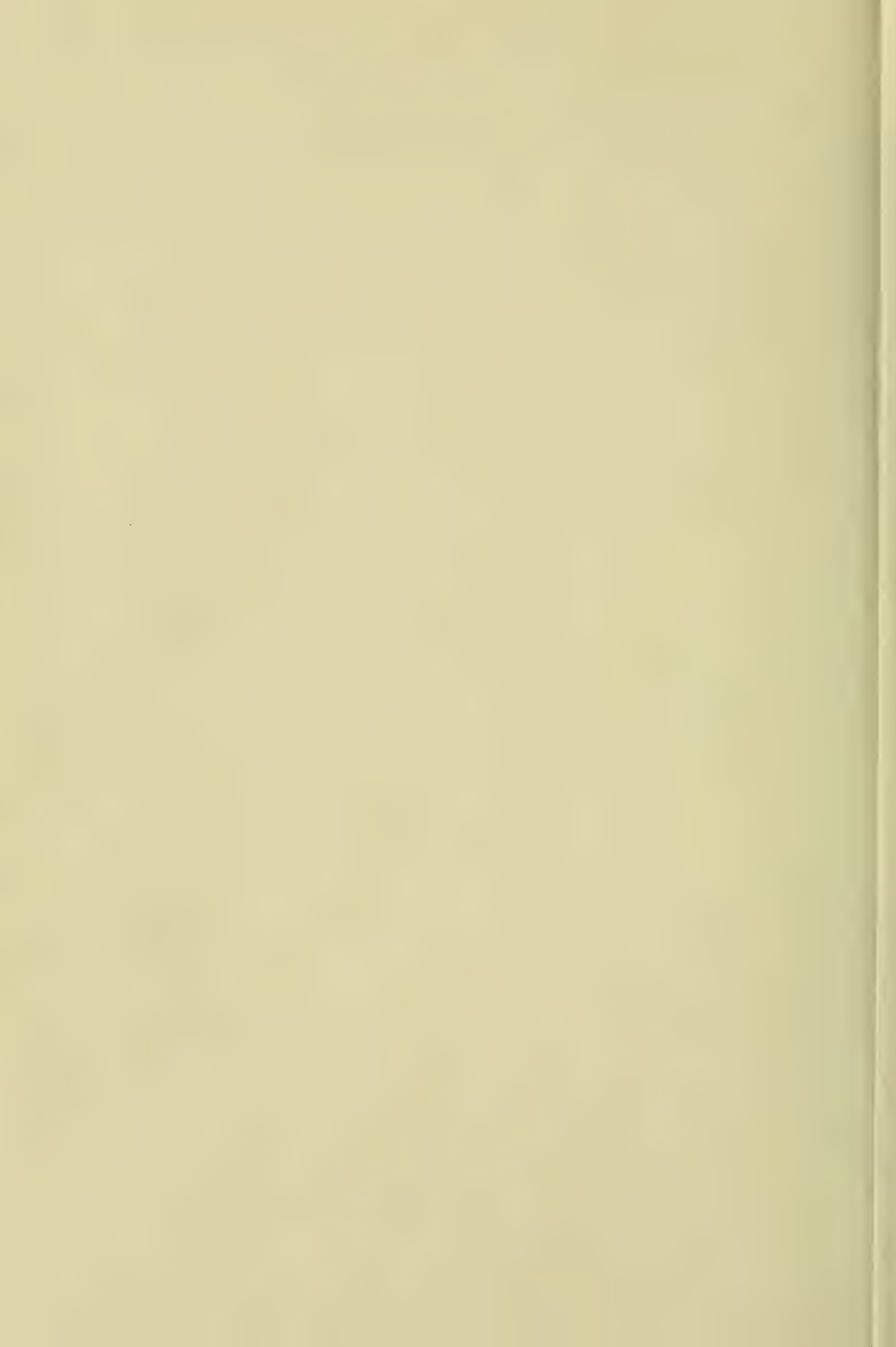
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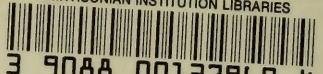
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